

# Backward control in Ancient Greek and Latin participial adjuncts

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**Abstract** This paper discusses evidence for backward control in Greek and Latin participial adjuncts. The data differs from all previously reported cases of backward control in not involving multiple case assignment and from all previous literature except Haddad (2011) in discussing adjunct control rather than complement control. The paper first briefly surveys backward control and how it has been accounted for in the literature. Section 2 brings theoretical background and looks closer at the mechanisms that are typically used in theoretical analysis of control and raising, namely movement/identity and coindexation. Section 3 describes some basic facts about Greek and Latin participles and gives some background on word order, which is crucial to the analysis. Since there is no case assignment in the lower (adjunct) clause, my analysis of the controller's position relies crucially on word order facts. Section 4 offers a corpus study corroborating the principle of clause-bound discontinuity: word order is not so free as to allow scrambling across clauses, including adjunct participle clauses. Section 5 provides an analysis of the Greek and Latin data within Lexical-Functional Grammar and discusses the distribution of backward and forward control. Section 6 gives conclusions.

**Keywords** Backward control · adjuncts · Greek · Latin · word order

## 1 Introduction

The discovery and analysis of control and raising phenomena by Rosenbaum (1967) was a major achievement of early generative grammar. And ever since, control and raising have functioned as testbeds for developments within the Chomskyan tradition, as documented in

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Davies and Dubinsky (2004), as well as a pivot for developing alternative frameworks within the broader generative tradition.<sup>1</sup>

Fruitful theoretical debates often yield new empirical discoveries, and the major discovery of the last decade's work in this field is certainly the fact that control relations are not necessarily unidirectional, as was previously taken for granted. That is, if we take as a starting point that control is a relation of referential dependency between an argument position in a matrix clause and an argument position in a dependent clause,<sup>2</sup> and that it is possible (but not obligatory) to leave unexpressed an argument which is referentially dependent, then there are three logically possible realizations of control:<sup>3</sup>

- (1) I persuaded Kim<sub>i</sub> [ $\Delta_i$  to smile].
- (2) I persuaded  $\Delta_i$  [Kim<sub>i</sub> to smile].
- (3) I persuaded Kim<sub>i</sub> [Kim<sub>i</sub> to smile].

With a few exceptions, such as the work of Harada (1973) and Kuroda (1978) on Japanese, work before Polinsky and Potsdam (2002a) only considered the pattern in (1), which was thought to be universal. The 2000s, on the other hand, have seen an increasing amount of work arguing for the empirical reality of the patterns in (2) and (3). Constructions like (2) are referred to as 'backward control'<sup>4</sup> and argued for in e.g. Polinsky and Potsdam (2002a,b); Sells (2006); Alboiu (2007); Potsdam (2009); Alexiadou et al. (2010); Haddad (2011). Constructions like (3) are called 'copy control' structures and are claimed to exist by e.g. Boeckx et al. (2007); Haddad (2009, 2011).<sup>5</sup> In this article I will be exclusively concerned with backward control and show that it exists in Ancient Greek and Latin participial adjunct clauses.

### 1.1 Backward control

Besides the intrinsic interest of backward control phenomena as a typological *rarum*, it has important theoretical implications for the theory of control. Many control theories come with built-in claims about the directionality of control. Particularly relevant here is the issue of whether control should be analyzed as coindexation (Rosenbaum 1967; Dalrymple 2001; Landau 2007, 2008; Sigurðsson 2008 among many others) or as identity/movement (Bresnan 1982; Hornstein 1999; Boeckx et al. 2010a; Hornstein and Polinsky 2010 and others), because most linguists assume that identity/movement-based theories can account more straightforwardly for backward patterns. Moreover, we will see that the crucial evidence for backward control rests on a study of the limits on syntactic discontinuities in

<sup>1</sup> Control and raising phenomena were central in the development of Lexical-Functional Grammar (Bresnan 1982) and, more recently, of 'Simpler Syntax' (Culicover and Jackendoff 2005, 2006). And of course all theories now have to incorporate control and raising phenomena, even if their primary motivation lies elsewhere.

<sup>2</sup> This definition is a modification of Potsdam (2009, p. 754) and makes clear that control (unlike binding, which is also a relation of referential dependency) only applies across clauses. Potsdam's definition is in turn based on Bresnan (1982) but crucially leaves out the stipulations on the overt vs. covert realization of the two arguments as well as the requirement that the lower argument should be a subject. The latter point is immaterial here and we will in fact only be dealing with cases where the lower argument is a subject, whether that is a universal fact about control or not.

<sup>3</sup>  $\Delta$  is a pre-theoretical notation for an unpronounced argument.

<sup>4</sup> Given that the property distinguishing forward and backward control is structural rather than linear, 'upward' and 'downward' would be better terms, but I keep the established terminology.

<sup>5</sup> Copy control has affinities with the grammar of resumption and so present an additional component beyond control; see Asudeh (2012) for a recent, thorough treatment of resumption.

languages with such free word order as Greek and Latin. This yields an interesting (and possibly cross-linguistically relevant) constraint on word order freedom, which is also an important preliminary to further studies of discontinuities at the subclausal level in these languages.

The example that first sparked the modern debate on backward control is still one of the most convincing ones. It involves the Tsez phase verbs *-oqa* ‘begin’ and *-iča* ‘continue’ (Polinsky and Potsdam 2002a). These can be raising verbs, as in English, but also control verbs. The difference is brought out by compatibility with adverbs such as ‘accidentally, unintentionally’ (only the raising verb) and ‘on purpose, deliberately’ (only the control verb), indicating that the control verb assigns an intentional agent role to its subject. The two constructions differ in their case and agreement patterns; (4-a) exemplifies the raising construction and (4-b) exemplifies the control construction:<sup>6</sup>

- (4) a. **kid**        ziya        b-išr-a        y-oq-si  
       girl.II.ABS cow.III.ABS III-feed.INF II-begin.PAST.EVID  
       ‘The girl began to feed the cow.’ = (8) in Polinsky and Potsdam (2002a, p. 249)  
       b. **kid-bā**    ziya        b-išr-a        y-oq-si  
       girl.II.ERG cow.III.ABS III-feed.INF II-begin.PAST.EVID  
       ‘The girl began to feed the cow.’ = (7) in Polinsky and Potsdam (2002a, p. 248)

The pattern in (4-a) is unexceptional, as both the infinitive and the finite verb agree in noun class with their absolutive argument. In (4-b), on the other hand, the finite verb apparently agrees with an ergative argument, which would be unique in the language. Polinsky and Potsdam (2002a, p. 248) therefore propose that the correct analysis is as in (5), where the ergative *kid-bā* is in the lower clause, but controls a position in the matrix which is absolutive:

- (5)  $\Delta_i$     [**kid-bā<sub>i</sub>**    ziya        b-išr-a]        y-oq-si  
       II.ABS girl.II.ERG cow.III.ABS III-feed.INF II-begin.PAST.EVID

Another persuasive example of backward control comes from object control in Malagasy (Potsdam 2009). On Potsdam’s analysis, sentences in this language consist of a ‘clauselet’ (Potsdam’s term) which is rigidly ordered V + SUBJECT + OBJECT + OBLIQUE + ADJUNCT, but where one constituent must be externalized to a clause-final position.<sup>7</sup> The verb bears ‘voice’ morphology corresponding to the role of the externalized argument.<sup>8</sup> In object control constructions where the externalized argument comes from the complement clause, it is possible to have either backward (6-a) or forward (6-b) control.<sup>9</sup> The topicalization of an element from the complement clause requires a special discourse context. Hence these examples are somewhat degraded, but not for syntactic reasons.

- (6) a. ??naneren’ i Mery [hofafa- **ko**]        ny trano  
       force.CT Mary sweep.TT 1SG.NOM the house  
       ‘Mary forced me to sweep the house.’ (= 17a in Potsdam (2009))

<sup>6</sup> The Roman numerals gloss noun classes and corresponding agreement on the verb, the other glosses follow the Leipzig format. Throughout the paper, the overt realization of an argument that is shared between two clauses in a control or raising construction is set in boldface.

<sup>7</sup> Potsdam does not further define what he means by ‘externalized’, presumably to remain neutral as to what exact syntactic operation is in play.

<sup>8</sup> This is glossed as AT for actor topic, TT for theme topic and CT for circumstantial topic.

<sup>9</sup> See Potsdam (2009) for why backward control can only occur in this context.

- b. ??naneren' i Mery **ahy** [hofafana] ny trano  
 force.CT Mary 1SG.ACC sweep.TT the house  
 'Mary forced me to sweep the house.' (= 16a in Potsdam (2009))

The nominative case marking on the shared argument in (6-a) makes it plausible that the correct analysis involves backward control:

- (7) ??naneren' i Mery  $\Delta_i$  [hofafa- **ko<sub>i</sub>**] ny trano  
 force.CT Mary  $\Delta$ .ACC sweep.TT 1SG.NOM the house  
 'Mary forced me to sweep the house.' (= 17a in Potsdam (2009))

In (6-b), by contrast, the shared argument bears accusative case, which makes it likely that it is assigned case in the upper clause where it has the object function.

It is crucial to note that both Tsez and Malagasy backward control involves case assignment in both the higher and the lower position. Moreover, the shared argument receives different case in the two clauses, and this fact is the crucial evidence that the argument is present in both clauses.<sup>10</sup> Other reported examples of backward control also involve multiple case marking.

Most of the literature on backward control has focused on complementation, but Haddad (2011) discusses control into adjunct participle clauses in Assamese. In this language, the subject of the participle and the subject of the matrix clause must corefer,<sup>11</sup> but the shared argument can be expressed either in the matrix (forward control as in (8)), in the adjunct (backward control as in (9)) or in both (copy control as in (10)). The copy and backward pattern are generally found when the participle is from a verb that takes an oblique case experiencer subject.

- (8) [ $\Delta_{i/*k}$  lottery jik-i] **Ram-e<sub>i</sub>** notun gfɔr kinil-e  
 $\Delta$ .NOM lottery win.PTCP Ram.NOM new house bought.3  
 'Having won the lottery, Ram bought a new house' (= example (13a.) from Haddad (2011, p. 77) )
- (9) [**Proxad-or<sub>i</sub>** lobfi lag-i]  $\Delta_{i/*k}$  cake-to khal-e  
 Proxad-GEN greed feel.PTCP  $\Delta$ .NOM cake-CL ate.3  
 'Proxad got greedy and ate the cake' (= example (16b.) from Haddad (2011, p. 79) )
- (10) [**Proxad-or<sub>i</sub>** lobfi lag-i] **xi<sub>i/\*k</sub>/gadfia-to-e<sub>i/\*k</sub>/Proxad-e<sub>i</sub>** cake-to  
 Proxad-GEN greed feel.PTCP he.NOM/donkey.CL.NOM/Proxad.NOM cake-CL  
 khal-e  
 ate.3  
 'Proxad got greedy and he/the idiot ate the cake' (= example (2b.) from Haddad (2011, p. 111) )

The acceptability of these constructions varies according to several factors that we will not go into here. The main point to note is that these examples are similar to what we have seen in Tsez and Malagasy, in that there is independent case assignment in both clauses.

In the literature, several more or less convincing examples of the same kind have been brought up, amounting to a sizeable body of cumulative evidence. Still, Potsdam (2009)

<sup>10</sup> This is only indirectly true of the Tsez case: The generalization that the verb agrees with its absolutive argument leads to the assumption that the matrix argument is absolutive. We return to this in section 2.4.

<sup>11</sup> According to Haddad (2011, chapter 2) there are some exceptions to this, in particular when both predicates are non-volitional. I will not go into this issue here, but it is clear that the argument that this is obligatory control relies crucially on a proper delimitation of such exceptions.

admits that “clear cases [of backward control] are rare”, and it is fair to say that the situation is not completely resolved. Landau (2007, p. 311) probably sums up the feelings of the sceptics: the data are interesting, the arguments look compelling, but doubts remain. From a theoretical perspective, backward control violates deep assumptions in control theory as well as other parts of the grammar such as case theory (multiple case assignment). On the empirical side, if backward control exists, why is it so rare, both cross-linguistically and within the languages that actually allow it? In Tsez, backward control is restricted to the two predicates ‘begin’ and ‘continue’, and other languages also have severe lexical limitations. In Malagasy, there seem to be no lexical restrictions, but backward control is only possible in cases of topicalization from the embedded clause.

The main empirical goal of this paper is to present evidence for an instance of backward control which is not similarly restricted to either specific lexical items and/or marginal syntactic constructions. Moreover the examples we will look at differ from all previously reported instances of backward control in *not* involving multiple case assignment. Case is assigned only once, in the matrix clause, even if the argument is overtly realized in the lower clause. For that reason, the Greek and Latin pattern of backward control cannot be explained as an effect of multiple case assignment.

## 1.2 Backward control in Greek and Latin participial adjuncts

Examples such as the following two, (11) from Latin and (12) from Greek, should not look exotic for those familiar with Latin and Greek.<sup>12</sup>

- (11) *discedens ab hibernis Caesar in Italiam ...*  
 depart.PP.NOM from winter quarters.ABL Caesar.NOM in Italy.ACC  
*imperat ...*  
 command.PRES.3.SG  
 ‘Departing from his winter quarters to Italy ... Caesar commands ...’ (Caes. Gal. 5.1.1)
- (12) *pempsanta de ton Kolkhōn basilea es tēn Hellada*  
 send.AP.ACC but the.ACC Colchus.GEN king.ACC to the.ACC Greece.ACC  
*kēruka aiteein*  
 legate.ACC ask.INF.PRES  
 ‘(They say that) the King of Colchus, sending a legate to Greece, asked ...’ (Hdt. 1.2.3)

In these examples, the subject of the participle (boldfaced), which is also the subject of the matrix verb, occurs ‘sandwiched’ between material from the participle clause (italicized), which is otherwise continuous. The surface structure is as in (13), where NP<sub>i</sub> is the subject of the participle, which is coreferent with a matrix argument Δ<sub>i</sub>.<sup>13</sup>

<sup>12</sup> The Greek and Latin glosses are somewhat reduced to make them easier to read, see the beginning of section 3. In references to Greek and Latin authors, the following abbreviations are used: B. Alex. – *The Alexandrian War*, Caes. Gal. – Caesar’s *Gallia War*, Cic. Att. – Cicero’s *Letters to Atticus*, Cic. de Orat. – Cicero’s *On the Orator*, Cic. Fin. – Cicero’s *On the ends of good and evil*, Hdt. – Herodotus’ *Histories*, John – *The Gospel of John*, Lucr. – Lucretius’ *On the nature of things*, Mark – *The Gospel of Mark*, Matt. – *The Gospel of Matthew*. Examples without references are constructed. Such examples are often from grammars, but are only used for convenient illustration of uncontroversial facts.

<sup>13</sup> In (11)–(12), the matrix position also has the subject function, but this is not always the case as we will see.

- (13)  $[S_{matrix} [S_{ptcp} V_{ptcp} \dots NP_i \dots] \dots \Delta_i V_{matrix} \dots]$

On the surface, such examples are very similar to Italian ‘Aux to Comp’ (Rizzi 1981, 1982), where a gerundive in certain specific configurations can assign nominative case to its subject. (14) shows an example where the participle’s subject is disjoint from any matrix argument.

- (14) Avendo Gianni/lei chiuso il dibattito, la riunione è finita prima  
 having Gianni/she.NOM closed the debate the meeting is finished before  
 ‘Gianni/Her having closed the debate, the meeting ended early.’

Adopting a similar view of (11) and (12), we would essentially be saying that these are constructions where the participle has an internal subject ( $NP_i$  in (13)) and the matrix argument  $\Delta_i$  is a coreferring but not controlled *pro*, i.e. a null pronoun. However, we will see in section 3.1 that there are clear reasons why such an analysis is not viable for the Greek and Latin cases: the participle does not in fact assign case to  $NP_i$ . Moreover, at least in Latin,  $NP_i$  can be quantificational. On the analysis in (13) it should not be able to bind a *pro* in  $\Delta_i$ .

This leaves us with two possible analyses: either we have backward control and  $NP_i$  is the subject of the participle, which controls a position in the matrix clause, where it receives case; or  $NP_i$  is the matrix subject and we have ordinary forward control, but the participle clause is in some way discontinuous. Since the word order of Greek and Latin is very free, arguments against the second view must be carefully structured. The empirical core of this paper consists of an extended corpus study showing that the kind of displacement that would be needed to account for (11)–(12) on the forward control view does *not* in fact occur in Greek and Latin. The data will be subject to statistical analysis showing that it is extremely unlikely that the absence of such movement is due to accident. Therefore, the word order facts confirm a backward control analysis of (11)–(12).

If the Greek and Latin examples are correctly analysed as backward control, then it is immediately clear that this must be a different kind of backward control from the patterns previously reported from Tsez, Malagasy and other languages where the controller gets case from the clause in which it appears structurally, i.e. the embedded clause in backward control structures. In Greek and Latin, the controller – although structurally in the embedded clause – gets case from the matrix clause. This has clear implications for how we should analyse the structures; in particular it bears on how we should implement syntactic identity.

The structure of the paper is as follows: Section 2 offers a summary of the theoretical issues. We focus in particular on how coindexation and identity, the two mechanisms that are generally used to account for control in most linguistic theories, apply to backward control and how they interact with case assignment. Where possible, the discussion is kept theory-neutral, but we also introduce details of Lexical Functional Grammar (LFG), which is the formal framework adopted in this article. Section 3 contains some background material on aspects of Greek and Latin morphosyntax that will be crucial for our discussion of control. Section 4 brings a corpus study of word order in Greek and Latin demonstrating a crucial limitation on word order freedom. On the basis of these data, section 5 offers a formal analysis of Greek and Latin participles and their control behaviour. Finally, section 6 offers conclusions.

## 2 The theory of control and raising

The backward examples cited in the introduction were all control structures. A related phenomenon is raising, which we take to differ from control in involving a non-thematic argument position in the upper clause, as in (15):

- (15) a. Tom seems to know the answer. (raising)  
 b. Tom hopes to know the answer. (control)

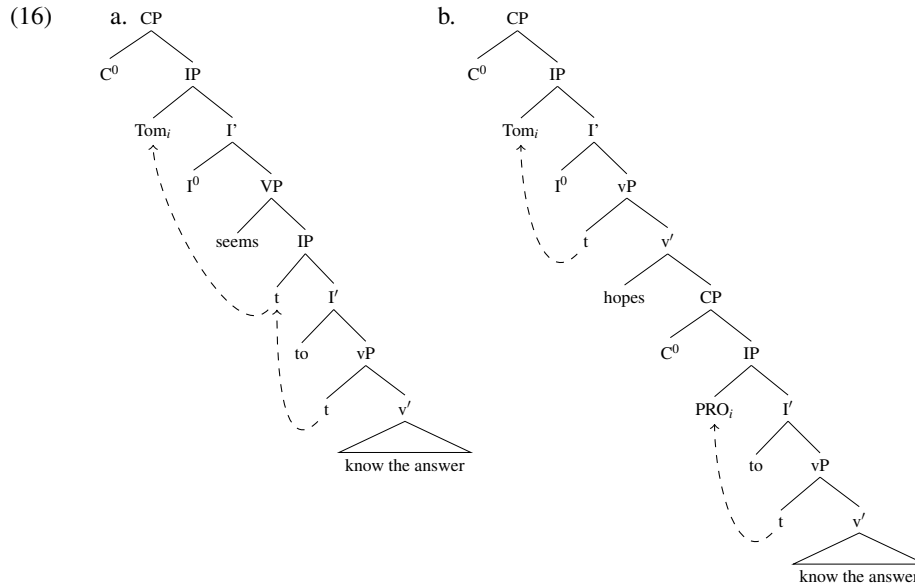
*seem* is semantically monovalent – its syntactic subject does not receive a thematic role. From the difference in thematicity several other phenomena follow (see Davies and Dubinsky (2004, p. 4–8) for an overview), such as acceptability of expletives and idiom chunks in raising as well as meaning preservation and absence of selectional restrictions in the passive under raising. Although the thematicity of the upper position can be taken as definitional of the control/raising distinction, grammatical frameworks have typically assumed more far-reaching, structural differences. At some level of abstraction, the mechanisms employed can be seen as similar across frameworks and can be grouped under the two headings identity and coindexing. Section 2.1 provides an overview of these strategies and sections 2.2–2.3 show how they have been deployed in the analysis of control, with a particular focus on the implications for case in control structures. Section 2.4 then discusses case in backward control constructions.

The discussion in this section is necessarily brief. For a more thorough treatment and a historical overview of the discussion, see Davies and Dubinsky (2004, chapter 13).

### 2.1 Identity and coindexing across frameworks

Broadly speaking we can make a distinction in the treatment of control and raising between identity-based treatments and coindexation-based treatments. This distinction is valid across frameworks even if the specific implementations differ. In the traditional generative analysis of raising and control, going back to Rosenbaum (1967), but given in (16) in a modernized version from Haddad (2011, p. 102),<sup>14</sup> raising is analysed as identity (16-a) and control as coindexation (16-b).

<sup>14</sup> Other modern analyses differ in details. Notice in particular that Haddad assumes that *seems* is in VP (rather than vP) because it is unaccusative.



In (16-a) *Tom* receives a theta-role in spec,vP of the lower clause, moves to the lower spec,IP to check EPP and then to the higher spec,IP to receive case. It does not get a theta-role in the higher clause. This captures the fact that *Tom* is not a thematic argument of *seem*. In (16-b), on the other hand, both *Tom* and *PRO* are assigned both theta-role and case. But beyond this difference in theta assignment in the upper clause, there are far-reaching structural differences. In (16-a), *Tom* originates in the lower argument position and moves to the higher argument position, so that at different points of the derivation, both argument positions are filled by the same syntactic object *Tom*. In the Copy Theory of Movement (Chomsky 1993), this is taken a step further, as syntactic objects that move are assumed to leave copies rather than traces.<sup>15</sup> In (16-b), on the other hand, there are two distinct, but coindexed syntactic objects, *Tom* and *PRO*. The two tokens are therefore not identical, but coindexation enforces identity of the referential properties.

Non-derivational theories typically capture identity through structure sharing rather than movement, i.e. instead of an element moving between two positions, it occupies both at once. The effect is in most respects the same, though we will see differences. In the following we focus on one such non-derivational theory, LFG, and provide enough detail for the reader to be able follow analyses of control in this framework without prior knowledge.

LFG distinguishes two levels of analysis that are relevant to syntax: Constituent structure (c-structure) is the overt, concrete level of linear and hierarchical organization of words into phrases. Functional structure (f-structure) is the abstract functional syntactic organization of the sentence, representing syntactic predicate-argument structure and functional relations like subject and object.

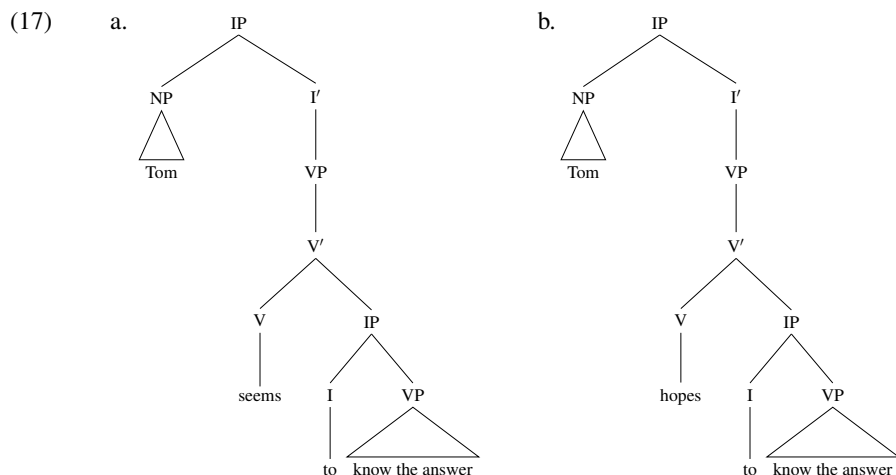
LFG's c-structure is surface-oriented and in the version we use here, it does not admit any empty categories.<sup>16</sup> This means that there are no functional categories other than those instantiated by function words, e.g. a CP layer is only assumed in clauses with a comple-

<sup>15</sup> The status of 'copies' is not entirely clarified. We will get back to this in section 6.2.

<sup>16</sup> There are versions of LFG (cf. e.g. Bresnan 2001; Falk 2007) which assume a (limited) use of empty categories e.g. for unbounded dependencies. No versions of LFG use empty categories for control and/or raising.



mentizer or a filled specifier position. LFG treats raising and control in the same way at the level of c-structure, as shown in (17).<sup>17</sup>



Since the surface-oriented c-structures of LFG do not admit empty categories, there is no PRO in the analysis of control above, nor is there any movement in the analysis of raising. This point is often misunderstood in comments on the LFG analysis found in the derivational literature (see e.g. Grano (2015, p. 2n1)): it is assumed that because the control complement is a VP, there is no syntactic representation whatsoever for the missing subject. But this is untrue: the controller-controllee dependency is captured at the level of f-structure, which is a syntactic representation and which includes a representation of the controlled subject.

F-structures are not represented as trees, but rather as attribute-value matrices. Attributes can be grammatical functions such as SUBJ, OBJ, ADJUNCT etc., or features such as CASE. The value of an attribute can be atomic (such as NOM, ACC), or it can be another f-structure, leading to embedding of f-structures. Finally, the value of the PRED-attribute is a special *semantic form* (enclosed in single quotes). The most important aspect of semantic forms for our purposes is that they include an argument list, i.e. a list of the arguments the predicate requires. (18) and (19) give sample semantic forms for an intransitive and a transitive verb respectively. The brackets indicate that the arguments are thematic: non-thematic arguments would be placed outside the brackets.

(18) 'WALK <SUBJ>'

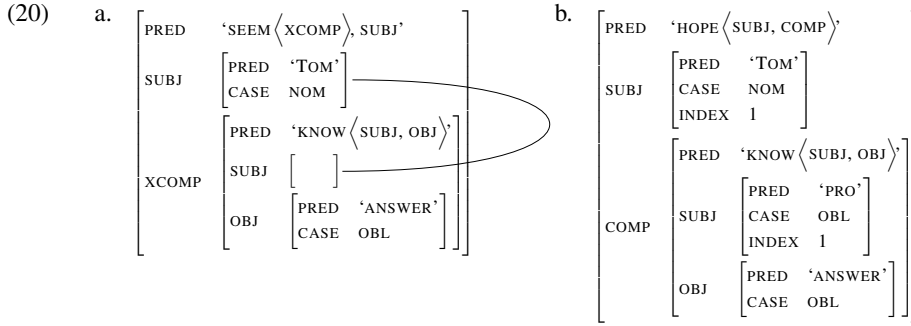
(19) 'DEVOUR <SUBJ, OBJ>'

There are basically two ways of analyzing control at f-structure. We first consider the analysis that involves a pronominal element ('anaphoric control').<sup>18</sup> This gives an account that is reminiscent of the standard derivational approach described above, involving different f-structures for control and raising, as shown in (20).<sup>19</sup>

<sup>17</sup> For concreteness, I have assumed an analysis where infinitival *to* is in I; but analyses with *to* in V, I and C have been proposed in the LFG literature, see Falk (2001, p. 144–147).

<sup>18</sup> We return to the alternative analysis in section 2.3.

<sup>19</sup> For concreteness, I assume that PRO bears oblique (OBL) case, although it is not clear that this is required for the grammar of English.



We see that the argument lists (as given by the semantic form of the verb) differ. The raising verb *seem* selects for a non-thematic subject (as indicated by SUBJ occurring outside the angular brackets) whereas the control verb *hope* selects for a thematic subject. Both verbs select for a clausal complement, but with different grammatical functions: *hope* takes a COMP, which is a ‘full’ complement clause including its own SUBJ function; by contrast, *seem* selects for an XCOMP which is a complement clause that shares its SUBJ function with some function (in this case SUBJ) in the matrix clause. This structure sharing is indicated by a curved line in (20-a).

In raising and in complement (but not adjunct) control, structure sharing originates in the lexical entry of the matrix predicate, in this case *seem*. This verb’s lexical entry includes the equation in (21), where *f* labels the main f-structure.

$$(21) \quad (f \text{ SUBJ}) = (f \text{ XCOMP SUBJ}).$$

This kind of *structure sharing* is an identity mechanism much like movement in derivational approaches, but we will see in section 6.2 that there are some important differences.

A control verb like *hope*, on the other hand, only identifies the indices of the two positions via an equation as in (22).

$$(22) \quad (f \text{ SUBJ INDEX}) = (f \text{ COMP SUBJ INDEX}).$$

This means that unlike in the raising analysis where we have a single element bearing two subject functions, control involves two coindexed subjects that are represented by distinct syntactic objects in the f-structure. (Although the embedded subject is not represented in the c-structure.)

If we now compare the LFG representations in (20) to the derivational analyses in (16), we see that despite the obvious differences of presentation, there are many similarities. In raising, the derivational account involves a single element receiving case in two positions; this corresponds to a single f-structure having two grammatical functions in the LFG account. In both cases, the uppermost position is non-thematic. In control, on the other hand, both the derivational and the non-derivational representations involve two different but coindexed elements, each of which has both case/grammatical function and a thematic role. In the following, we first look closer at the traditional analysis of control as coindexation, and then consider alternative analyses of control as more raising-like, i.e. involving identity.

## 2.2 Control as coindexation

Most empirical differences between control and raising actually follow from the contrast in thematicity of the upper position as we noted in the beginning of section 2. But as section 2.1 showed, linguistic frameworks have typically assumed important structural differences as well. The traditional view in generative grammar ever since Rosenbaum (1967) is the one sketched there, i.e. that control is coindexation and raising is identity. Beside mainstream derivational grammar and LFG (in the version presented above), this view is also found in many non-derivational theories such as Head-driven Phrase Structure Grammar and Lexicalized Tree Adjoining Grammar. It can be summarized as in (23), where we see that the distinction in thematicity of the upper argument correlates with the distinction between coindexation and identity:

(23)

	Thematic	Non-thematic
Coindexation	+	-
Identity	-	+

Case assignment in the lower clause is one phenomenon that appears to have nothing to do with the contrast in thematicity, but has a natural connection to the coindexation vs identity opposition. A coindexation analysis assumes two distinct syntactic objects and therefore naturally allows for an analysis where the two objects get distinct cases. Icelandic exemplifies this, as shown in Andrews (1982, 1990); Sigurðsson (2008). The examples in (24) are from Sigurðsson (2008, p. 407).

- (24)
- a. **Ólaf<sub>i</sub>** langar ekki til að PRO<sub>i</sub> vera ríkur  
 Olaf.ACC longs not for to NOM be rich.NOM  
 ‘Olaf doesn’t want to be rich.’
  - b. **Ólaf<sub>i</sub>** finnst gott að PRO<sub>i</sub> vera ríkur  
 Olaf.DAT finds good to NOM be rich.NOM  
 ‘Olaf finds it nice to be rich.’

The embedded predicate *ríkur* agrees with its subject PRO, which hence must bear nominative case. Sigurðsson (2008) shows that this is structural and not default case. Observe that the matrix controller is in the accusative (24-a) and dative (24-b), so PRO cannot have its case from the controller. In this, Icelandic control differs from Icelandic raising, where the case is the same in both clauses (and in fact percolates from the lower clause to the higher, although this need not detain us here). On the basis of this contrast, Andrews (1982, 1990) argued that control and raising must involve different syntactic mechanisms in Icelandic: specifically, control is coindexation and raising is identity. A similar argument has been made in a derivational setting by Landau (2007, 2008) and Sigurðsson (2008). Hence, we get the traditional correlation between thematicity of the upper position and coindexation and correspondingly between non-thematicity of the upper position and identity/movement.

In Government and Binding Theory, this view in fact followed directly from the theta criterion, which requires that every argument bears exactly one thematic role. If we were to assume coindexation in raising structures, that would leave the upper argument with no thematic role, since the upper position is by definition non-thematic. Conversely, if we assume identity in control, the shared argument will have two thematic roles, one assigned by each verb.

However, it is clear that the ban on arguments with no thematic role has better independent motivation than that on multiple thematic roles. Disallowing arguments without

thematic roles plays a central part in ruling out e.g. objects with intransitive predicates. By contrast, arguments with two thematic roles would only occur in control structures, so the principle cannot be externally motivated. For this reason, Bresnan (1982) assumed that arguments can have multiple roles; similarly, in the Minimalist program, the theta criterion is replaced by the principle of full interpretation, which still requires every argument to receive a thematic role, but allows multiple roles.

### 2.3 Control as identity

Once one allows arguments with multiple thematic roles, there is an obvious temptation to reduce control and raising to a single syntactic mechanism, as illustrated in (25):

(25)		Thematic	Non-thematic
	Coindexation	-	-
	Identity	+	+

In LFG, this can be done simply by using an equation like (21) in the lexical entry of a verb with a thematic subject position. This results in identification of two *thematic* positions (Bresnan 1982). Similarly, in derivational theories, and particularly within the movement theory of control (MTC, see Hornstein (1999); Boeckx et al. (2010a); Hornstein and Polinsky (2010)), we can replace the PRO in (16) with the trace (or copy) of the NP, which later moves on to the specifier of the higher vP and finally to that of the higher IP, thus receiving two theta roles before it gets structural case in the higher clause. In both versions, this makes control identical to raising in all respects other than the thematicity of the upper position.

One argument for control as identity comes from case transmission from the upper to the lower clause. We need to be careful in interpreting such data, however. Even in Icelandic, where independent case is the norm, as we saw, it is under certain circumstances possible for a predicative in the embedded clause to agree in case with the overt controller in the matrix, as in (26) with the control verb *vonast* ‘hope’ (from Andrews (1982, p. 26)).

- (26) *ég tel hana vonast til að vera góðan/góður*  
 I.NOM believe her.ACC hope for to be good.ACC/NOM  
 ‘I believe her to hope to be good.’

The embedded predicate can be either *góðan*, in apparent agreement with *hana* in the matrix, or *góður*, in apparent agreement with the null subject of *vera*, which we expect from (24) to have nominative case. This has been analyzed as a performance phenomenon (Andrews (1982, p. 27): “rather than agreeing with its invisible functional subject, the adjective is agreeing with the latter’s nearby and visible coreferent”) or a shallow morphological phenomenon (Sigurðsson 2008, p. 414). In the HPSG approach of Przepiórkowski and Rosen (2005), on the other hand, the phenomenon is taken as an instance of grammatical underspecification: coindexation is achieved through structure sharing of the two arguments’ indices, without however ruling out more extensive structure sharing of the entire argument positions.

On either of these analyses, it is predicted that coindexation structures vary between case transmission and case independence. In other words, the *possibility* (but not necessity) of case transmission is taken to diagnose coindexation. However, there are languages where case transmission is uniform and hence does not bear out this prediction. Landau (2008, p. 917) cites Czech, Slovak and Slovenian. (27) is from Czech.

- (27) Donutil jsem **ho** PRO přijít samotného  
 forced AUX.1sg him.ACC PRO.ACC to come alone.ACC  
 ‘I forced him to come alone.’

On Landau’s view, such case transmission results from PRO agreeing in case with its antecedent. This runs counter to the generalization that case is not generally an agreement feature; and that when case agreement nevertheless is found, it is typically in head-modifier constellations and not in coreference relations such as anaphora (Corbett 2006, p. 133–135). Systematic agreement between controller and controllee of the kind posited by Landau would violate this observation. Case transmission is therefore a potential argument for an identity analysis. But note that this only holds whenever case transmission is *systematic*. In languages like Icelandic, case transmission is marginal in control structures and does not therefore supply an argument for an identity approach to control, as is clear from the discussion between Bobaljik and Landau (2009) and Boeckx et al. (2010b). Systematic case transmission, on the other hand, is standardly used as an argument for an identity analysis in LFG because it follows naturally on the non-derivational implementation of identity where the same syntactic object occupies two positions. Systematic case transmission is found as an argument for identity analyses within the MTC too (Cecchetto and Oniga 2004), but in a derivational implementation of identity, there are other options, as one can assume sequential case assignment with overwriting.

In any case, the importance of systematic case transmission has also been underlined in work that starts from a different perspective, namely the nature of the coreference relationship between the controller and the controllee. As is by now well established, especially by the work of Landau (2000, 2008, 2015), some but not all control structures allow the possibility of partial control, cf. the contrast between *agree* and *try* in (28).

- (28) a. The chair agreed to gather at six.  
 b. \*The chair tried to gather at six.

Within the study of partial control, there is a tradition (Cinque 2006; van Urk 2010; Grano 2015) for taking the possibility of partial control (as in (28-a)) to diagnose coindexation, whereas strict exhaustive control diagnoses identity. Moreover, the connection with case has been emphasised, e.g. by Grano (2015, p. 38), who puts forth the generalization in (29).

- (29) a. The embedded subject position under an exhaustive control predicate is always non-case-marked  
 b. The embedded subject position under a partial control predicate is always case-marked.

Under the identification of exhaustive control with identity and partial control with coindexation, this amounts to saying that there is never case independence in identity structures.

## 2.4 The evidence from backward control

As we just saw, there is a strong tradition for taking obligatory case transmission to diagnose identity structures. On the other hand, backward control is *also* almost universally taken as a strong argument for an identity analysis of control. For example, Landau (2007, p. 311) says that “the evidence for backward control (more so in Tsez than in Brazilian Portuguese) is a real challenge to standard theories of OC, perhaps the most challenging phenomenon presented so far by proponents of the movement approach.” The reason is that coindexation

theories typically require a coindexed element to be lower in some relevant hierarchy than the element it is coindexed with. In other words, coindexation is asymmetric and always works down the tree, against what we see in backward control.

Given that both obligatory case transmission and backward control are taken to diagnose identity structures, it is striking that the reported cases of backward control never show case transmission, only case independence. There are two main approaches to this problem. On their original, conservative view, (Polinsky and Potsdam 2002a) assumed that control chains have only one Case position and the NP is pronounced in the position where Case is checked, i.e. in the embedded clause in cases of backward control. But that approach had the disadvantage of not assuming an absolutive position in the upper clause, with which the matrix verb could agree, as in (5). More recent analyses such as Polinsky and Potsdam (2006), Boeckx et al. (2010a, p. 157-158), Haddad and Potsdam (2013, p. 241), and tentatively Grano (2015, p. 196) typically assume multiply case-marked chains, in other words that Case feature checking occurs sequentially, with one Case feature value overwriting a previous one”.

It should be noted that multiple case assignment, although widely adopted today, is a radical departure from traditional Principles and Parameters Case theory, with theoretical implications that have not been fully clarified, as admitted by Haddad and Potsdam (2013, p. 241). The most relevant worry for control theory is voiced by Landau (2013, p. 122): “If structural case is available both in the embedded subject position and in the matrix controller position, nothing seems to prevent merging two independent DPs in these positions, each checking its own  $\theta$ - and case features and bearing no referential dependency to each other.”

It is beyond the scope of this paper to offer a full answer to how we should best analyze those instances of backward control which involve multiple case assignment. Instead, we will show that there are *also* instances of backward control with case transmission, bearing out the predictions of a traditional identity analysis. Besides being an important fact by itself, this also sharpens the challenge that we face in accounting for the data from Tsez and other languages: We must clearly account for backward control in a way that allows for case independence (as in Tsez), but we must do so in a way which does not preclude the possibility of case transmission (as in Greek and Latin). In a sense, this makes backward control more similar to ordinary forward control: it is not parasitic on multiple case assignment, but occurs with both case independence and case transmission.

### 3 Greek and Latin morphosyntax

Greek and Latin are typical ancient Indo-European languages: dependent-marking, with rich morphology and free word order. Nouns have inherent gender (masculine/feminine/neuter) and inflect for case and number. Adjectives and determiners agree with their nouns in case, number and gender. Finite verbs inflect for mood, voice and tense/aspect, and agree with their subject in person and number. Infinitives inflect for aspect (in Greek) or relative tense (in Latin), and for voice in both languages. Participles, which are our main concern here, inflect for the same verbal categories as infinitives (aspect/relative tense and voice); they also have the nominal features case, number and gender as agreement features. Not all combinations of tense/aspect and voice exist and of those that do exist, not all are equally frequent. In the examples in this paper, Latin examples will have present or perfect participles, and Greek examples will have either present or aorist (perfective) participles. To simplify the glossing, I will use PP, PRFP and AP respectively. Moreover, since the morphology is rich, but often irrelevant for our purposes, I have reduced the glosses somewhat to make them

easier to read: gender is ignored and number is only indicated by the English gloss of the lemma (so ‘boys’ rather than ‘boy.PL’). Indicative mood and active voice are not glossed. The Latin perfect participle is always passive and is not glossed for that (except in deponent verbs which have passive forms but active syntax and semantics; these are glossed as active).

I will now discuss the morphosyntax of participles (3.1), which are the focus of the article, and some facts about word order (3.2), which is crucial to the analysis. Since section 4 of this article deals with data from Herodotus, the Greek New Testament and Caesar, care has been taken to illustrate all the phenomena discussed in this section with examples from these three texts.

### 3.1 The morphosyntax of Greek and Latin participles

Greek and Latin participles have a wide variety of uses as attributes, complements, free predicatives, in periphrastic tenses and as predicates in absolute constructions. One basic generalization that holds for all these uses is that the participle (when not from an impersonal verb) always agrees in case, number and gender with a syntactically visible noun phrase, i.e. an overt DP or a null argument that is assigned case by its predicate, but not e.g. an implicit agent or experiencer. The examples in (30)–(39) illustrate this behaviour in Latin. The Greek facts are the same. The simplified glossing only illustrates case agreement; there is also agreement in number and gender.

- (30)    rosa        florens        pulchra        est  
           rose.NOM bloom.PP.NOM beautiful.NOM be.PRES.3.SG  
           ‘The blooming rose is beautiful’ (attributive)
- (31)    rosa        florens        est  
           rose.NOM bloom.PP.NOM be.PRES.3.SG  
           ‘The rose is blooming’ (subjective predicative complement)
- (32)    vidi            puerum    currentem  
           see.PRF.1.SG boy.ACC run.PP.ACC  
           ‘I saw the boy running’ (objective predicative complement)
- (33)    te            sum            visurus  
           you.ACC be.PRES.1.SG see.PTCP.FUT.NOM  
           ‘I will see you’ (periphrastic future)
- (34)    amatus        est  
           love.PRFP.NOM be.PRES.3.SG  
           ‘He was/has been loved’ (periphrastic perfect)
- (35)    rosa        florens        pulchra        est  
           rose.NOM bloom.PP.NOM beautiful.NOM be.PRES.3.SG  
           ‘A rose is beautiful when it blooms’ (subject-oriented free predicative)
- (36)    fugientem    silvae        texerunt  
           flee.PP.ACC woods.NOM shelter.PRF.3.PL  
           ‘The woods sheltered (him) as he fled.’ (Caes. Gal. 6.30.4, (null) object-oriented free predicative )
- (37)    magnam    multitudinem    eorum    fugientium    conciderunt  
           large.ACC multitude.ACC they.GEN flee.PP.GEN kill.PRF.3.PL  
           ‘They killed a large number of them as they were fleeing.’ (Caes. Gal. 2.11.4, genitive-oriented free predicative)

- (38) ... cenanti mihi nuntiarit Cestius ...  
 dine.PP.DAT I.DAT announce.PRF.SBJV.3.SG Cestius.NOM  
 ‘...while I was dining, Cestius announced to me ...’ (Cic. Att. 5.13.1, dative-oriented free predicative)
- (39) his pugnantibus illum in equum quidam ex suis  
 they.ABL fight.PP.ABL him.ACC in horse.ACC someone.NOM from his own.ABL  
 intulit  
 mount.PRF.3.SG  
 ‘while they were fighting, one from his [attendants] mounted him on a horse.’ (Caes. Gal. 6.30, absolute)

Observe that the participles can enter into two different, clause-like, adjoined constructions: the free predicative construction (also called conjunct participle, which is the terminology I will use from now on), and the absolute construction. In the former construction, the participle takes as its subject an argument from the matrix clause. As illustrated in (36)–(38) this is not necessarily the matrix subject. The participle’s subject is assigned case in the matrix clause, and the participle agrees with it in number, gender and case. In the absolute construction, the participle has a subject that does not appear in the matrix. Both the participle and its subject appear in an oblique case, the ablative in Latin and the genitive in Greek.

Note that (30) and (35) are string-identical, although the two readings are clearly semantically distinct. It is relatively clear that (30) is a reduced relative clause which adjoins to the noun, forming a single constituent whose outer label is nominal. It is crucial for our purposes that (35) is a distinct structure, for otherwise we open up for an analysis of (11)–(12) where the participle has been displaced to the left of the noun but remains inside a nominal constituent, as in (40).<sup>20</sup>

- (40)  $[S_{matrix} [DP \ V/XP \ [NP_i [S_{ptcp} \ \Delta_i \ t \ \dots] ] ] \dots V_{matrix} \dots]$

The assumption here is that  $V/XP$  is in spec,DP or some other functional projection one could assume at the left periphery of a noun. Notice that it is not always clear that the fronted material is a constituent (this can be doubted in (11) and is clearly not the case in (55) below), so this forces us to assume a very rich left periphery in nouns which can host several constituents. There is as far as I know no independent evidence for this. In any case, we will see that the hypothesis does not account for the facts.

(40) would essentially claim that (30) and (35) are base generated as identical structures, against the traditional view in Greek and Latin linguistics that the structures are distinct. There are good reasons to uphold the traditional view. It is clearly the default hypothesis: there is a semantic distinction between (30) and (35) and it is unclear how this arises if the structures are identical modulo displacement to a functional projection. In (30), the noun + participle clearly has a type *e* reading, i.e. a nominal one. In (35), by contrast, it has a propositional meaning, i.e. a verbal one.<sup>21</sup> Put in other words, the meaning we see in (35)

<sup>20</sup> I thank a reviewer for prompting me to think about this alternative.

<sup>21</sup> For a detailed analysis of the semantics of such structures in Ancient Greek, see Bary and Haug (2011).



is unexpected if we are dealing with a relative clause.<sup>22</sup> To back up the distinction there are also a number of other differences.

First, although (30) and (35) are identical in Latin, there is an inflectional distinction that shows up in the ablative only: attributive participles take the ending *-i* (41) and predicative participles (both conjunct and absolute) the ending *-e* (42)–(43).

- (41)    nec        tuos        ludos        aspexit        in illo ardenti        tribunatu  
          and.not your.ACC games.ACC watch.PRF.3.SG in this burning.ABL tribunate.ABL  
          suo  
          REFL.POSS.ABL  
          ‘he did not visit your shows during that fiery tribunate of his’ (Cic. Sest. 116)
- (42)    ingressus        in forum        ardente        curia  
          enter.PRFP.NOM in forum.ACC burn.PP.ABL curia.ABL  
          ‘entering the forum as the curia was burning (with eagerness)’ (Cic. Mil. 61)
- (43)    quis        enim non dixit        Eupolin        ab Alcibiade        navigante  
          who.NOM for not say.PRF.3.SG Eupolis.ACC by Alcibiades.ABL sailing.PP.ABL  
          in Siciliam deiectum        esse in        mare?  
          to Sicily throw.PRFP.ACC be into sea.ACC  
          ‘Who doesn’t say that Eupolis was thrown into the sea by Alcibiades as he was  
          sailing to Sicily?’ (Cic., ad Att. 6.1.18)

Since this morphological distinction is regulated by the syntactic environment (see Kühner 1912, p. 351 and Leumann 1977, p. 438), it strongly points to a syntactic distinction.

Second, there is a difference in the type of subjects we find in (30) and (35). The participle’s nominal in structures like (35) can be a pronominal, cf. (37) and (38), which is mysterious on the analysis in (40). Although negative judgements are always problematic in dead languages, it seems relatively uncontroversial to claim that *eorum fugientium* in (37) cannot mean ‘those who were fleeing’.

Third, in Greek, there is even more direct evidence for the distinction between attributive and predicative participles, pointing explicitly to attributive participles being part of a nominal projection in a way that predicative ones are not. This shows up in noun phrases with a definite determiner (there is no indefinite determiner in Greek). Attributive participles must always directly follow the determiner. This can happen in two ways: either the participle is intercalated between the determiner and the noun, or the participle is to the right of the noun (either directly or discontinuously), in which case the article is repeated. By contrast, predicative participles are never allowed to directly follow the determiner. Thus we get three patterns with two distinct meanings which are described in all grammars of Greek (see e.g. Schwyzler 1950, p. 26). (44)–(46) illustrates the patterns (the relevant participles are italicized): in (44), the participle is not preceded by the determiner and the meaning is predicative. In (45), the participle is intercalated between the determiner and the noun and the meaning is attributive. In (46), the participle *aidomenous* is displaced from its noun but the determiner is repeated; the meaning is attributive. Observe that (46) also contains a predicative participle *elthōn*: its subject is *ōlēn*, which has a determiner, but the determiner is not repeated with the predicative participle.

<sup>22</sup> There is a third possible reading of the participle as an appositive (non-restrictive) reduced relative, which would give us a type ‘*e* + proposition’ meaning, which is closer to (35). Such readings clearly exist in Greek and Latin but they are irrelevant here because appositives are commonly assumed not to form a nominal constituent with their antecedent (see de Vries 2002, chapter 6 for an overview of theories).

- (44) *apeilēthenta dē ton Ariona es aporiēn paraitēsasthai*  
 force.AP.PASS.ACC then the.ACC Arion.ACC into distress.ACC ask for.PERF.INF  
 ‘(They say that) Arion, when forced into this distress, asked ...’ (Hdt. 1.24.4)
- (45) *tēn gar Asiēn kai ta enoikeonta ethnea barbara*  
 the.ACC for Asia.ACC and the.ACC live.PP.ACC people.ACC foreign.ACC  
*oikēieuntai hoi Persai*  
 claim.as.one’s.own.PRES.MID.3.PL the.NOM Persians.NOM  
 ‘For the Persians claim as their own both Asia and the foreign peoples living there.’  
 (Hdt. 1.4.4)
- (46) *houtos de ho Ōlēn kai tous allous tous palaious*  
 this.NOM but the.NOM Olen.NOM also the.ACC other.ACC the.ACC old.ACC  
*humnous epoiēse ek Lukiēs elthōn tous*  
 hymns.ACC make.PFV.3.SG from Lycia.GEN come.AP.NOM the.ACC  
*aeidomenous en Dēlōi*  
 sing.PP.PASS.ACC in Delos.DAT  
 ‘This Olen, after coming from Lycia, also made the other old hymns that are being  
 sung in Delos’ (Hdt. 4.35.3)

This shows that predicative participles head a projection which is not a subconstituent of their subjects’ nominal projection. By contrast, a very natural interpretation of the data is that attributive participles *are* DP internal, as mirrored in their surface position immediately following a determiner. The upshot of this is that it is *not* possible to construe the bracketed *apeilēthenta dē ton Ariona es aporiēn* in (44) as a reduced relative, i.e. as a constituent whose outer label in nominal: this would require the determiner to precede the participle. Too see this clearly, consider what happens in structures which clearly are reduced relatives (also semantically) when the participle is positioned to the left of the noun:

- (47) *tōn mellontōn genesthai kakōn kata ton*  
 the.GEN be about to.PP.GEN. happen.PFV.INF.MID evils.GEN concerning the.ACC  
*paida*  
 son.ACC  
 ‘the evils that were about to happen concerning his son’ (Hdt. 1.34.1)

*mellontōn genesthai kata ton paida* is a reduced relative which is split by its head noun *kakōn*. The participle (and its complement infinitive) occur to the left of the head noun, but crucially remain to the right of the determiner, and the observation of the traditional grammars cited above is that it has to remain there. Given that this is what we observe in structures that semantically must be reduced relatives, it is clearly ad hoc to assume that this restriction can be violated in reduced relatives only in the cases where the semantics is not that of a reduced relative, as in (12).

Evidence that the participle’s projection is clausal comes from the fact that it can be a binding domain. This is shown for Latin participles in Haug and Nikitina (2015, p. 10–1) and the same is true in Greek (48).

- (48) *hoi de Persai ... Kroison ezōgrēsan ...*  
 the.NOM but Persians.NOM Croesus.ACC capture alive.PFV.3.PL.  
*katapausanta tēn heōtoutou megalēn arkhēn*  
 stop.AP.ACC the.ACC REFL.GEN great.ACC empire.ACC

‘The Persians captured Croesus alive, (he) destroying his own great empire’ (Hdt. 1.86.1)

The possessive reflexive *heōtoutou* is coreferent with the matrix object *Kroison*, but since Greek reflexives are subject-oriented (Kiparsky 2012), the binder must be the participle’s subject position.

Haug and Nikitina (2012, 2015) provide further arguments for a clausal analysis of participles and develop an LFG analysis where the noun with which the participle agrees is always (even in attributive structures) the subject of the participle. The analysis relies on structure sharing: in all cases except the absolutes, the noun phrase also bears another grammatical function. In this other function, the noun phrase is assigned case, and it is this case that gets transmitted to the participle via agreement. The agreement facts in (30)–(39) therefore all follow from ordinary subject-predicate agreement, although the agreement features are different in finite verbs (person and number) and nonfinite verbs (gender, number and case). This analysis achieves theoretical parsimony, but for our current purposes nothing hinges on the specifics. The main fact to keep in mind is that except in the absolute construction, the participle agrees in case with an NP that has case from some position outside the participle clause. And in the absolute construction, too, the participle and its subject agree in case, although it is less obvious where this case is assigned from.

These agreement facts immediately ruin an analysis of (11)–(12) as ‘Aux-to-Comp’. The reason is that the overt NP bears the case assigned in the matrix. In other words, the structure is not just (13), but the more specific structure in (49), where  $\alpha$  is the case assigned by  $V_{matrix}$ .

(49)  $[S_{matrix} [S_{ptcp} V_{ptcp} \dots NP_i, CASE=\alpha \dots] \dots \Delta_i, CASE=\alpha V_{matrix} \dots]$

At this point, we have not yet established that  $NP_i$  is structurally in the participle clause, so the bracketing is only an indication of the surface order: it could be that  $NP_i$  belongs structurally in the matrix clause and we have a discontinuous constituent. The important point is that  $\alpha$  is the case assigned by  $V_{matrix}$  (whether to  $\Delta_i$  or directly to  $NP_i$ ). In other words,  $NP_i$  in (12), repeated here as (50), is accusative because the matrix position is assigned accusative. The matrix position in turn is assigned accusative because the verb is infinitive. The variant of (12) with a finite matrix assigning nominative to its subject would be as in (51).

(50) *pempsanta de ton Kolkhōn basilea es tēn Hellada*  
 send.AP.ACC but the.ACC Colchus.GEN king.ACC to the.ACC Greece.ACC  
*kēruka aitein*  
 legate.ACC ask.INF.PRES  
 ‘(They say that) the King of Colchus, sending a legate to Greece, asked ...’ (Hdt. 1.2.3)

(51) *pempsas de ho Kolkhōn basileus es tēn Hellada*  
 send.AP.NOM but the.NOM Colchus.GEN king.NOM to the.ACC Greece.ACC  
*kēruka ēitēse*  
 legate.ACC ask.PRES.3.SG  
 ‘The King of Colchus, sending a legate to Greece, asked ...’

We see that if the matrix verb is finite and assigns nominative case, then both the participle and its subject must be nominative. This is clearly incompatible with an account where the relationship between  $NP_i$  and  $\Delta_i$  is one of pronominal coreference only: if *basileus* is

simply the antecedent of a *pro* in the main clause, there is no reason why it should vary in case depending on the function of the pronoun. As pointed out above, it is typologically rare for anaphors (in the broad sense of coreferring elements) to agree in case with their antecedents: assuming the opposite phenomenon is completely unmotivated, but is what an ‘Aux-to-Comp’ analysis would force us to.<sup>23</sup> In other words, we have to assume that  $NP_i/\Delta_i$  is in the matrix clause at some level of syntactic representation, where it receives case. On the other hand,  $NP_i/\Delta_i$  must also be present in the participle clause to induce case agreement on the participle. So to account for the phenomenon, we need one position in the matrix clause and one position in the participle clause. These positions are obligatorily coreferent, so we have “a relation of referential dependency between an argument position in a matrix clause and an argument position in a dependent clause”, in short, control. In particular, we need a notion of control that is able to transmit the case feature between the two positions. What remains is to establish the directionality, i.e. is  $NP_i$  in the matrix clause and  $\Delta_i$  in the adjunct, or the other way around?

Before we pass to that question, notice that there is another, independent argument that  $NP_i/\Delta_i$  must be present in the higher clause and that we are not dealing with a matrix null argument (*pro*). This comes from backward control-like structures with a quantificational DP.<sup>24</sup> A quantificational DP in the participle clause should not be able to be co-indexed with a *pro* in the matrix without c-command, so if the controller is quantificational it must also be present in the matrix clause. To rule out collective readings where the quantifier sets up a plural discourse referent, we must look at distributive quantifiers. There are no such examples of backward controllers in my corpus (probably due to the scarcity of distributively quantificational DPs in the first place), but it is not too hard to find examples from outside the corpus.<sup>25</sup>

- (52) cum se quisque victu suo fraudans  
 since REFL.ACC each.NOM sustenance.ABL REFL.POSS.ABL deprive  
 detractum corpori atque usibus necessariis ad honorem unius  
 subtract.PRFP.ACC body.and.necessities.DAT to honour.ACC one.GEN  
 viri conferret  
 man.GEN bestow.IPFV.SBJV.3.SG  
 ‘since each man, depriving himself of his own sustenance, bestowed what he had  
 subtracted from his physical necessities to do honour to one man’ (Livy 5.47.8)

If we can establish that *quisque* is in the participle clause, as the word order suggests, this rules out an analysis with *pro* in the matrix clause, because the quantifier would not be able to bind it.

### 3.2 Clause-bound discontinuity

To establish the directionality of control, it is necessary to determine in which clause the shared argument structurally belongs. In the cases of backward control that we saw in section 1 this was done on the basis of case. It is the ergative in (5) and the nominative in (7) that make it likely that the overt manifestation of the shared argument is in the structurally lower

<sup>23</sup> Note also that overt anaphors do not agree with their antecedents in case in Greek or Latin.

<sup>24</sup> I thank a reviewer for bringing this test, first suggested by Cormack and Smith (2002), to my attention.

<sup>25</sup> B. Alex. 16, Cic. Att. 4.2.3, de Orat. 1.217 and Lucr. 4.962 are other examples from Classical Latin. It is harder to search for examples in Greek, which has no dedicated distributive quantifier.

clause. However, because of the agreement facts sketched in section 3.1, case cannot be used as a diagnostic in Greek or Latin. Instead we must rely on word order.

We already saw (11), (12) and (52) where the word order seems to suggest backward control. (53)–(56) show some more examples. The shared argument (in boldface) appears sandwiched between the participle and one or more of its other arguments or a conjunction which coordinates the participle (in italics).

- (53) en tēi hēmerāi ekeinēi *exelthōn* **ho** **Iēsous** ek tēs  
 in the.DAT day.DAT that.DAT step out.AP.NOM the.NOM Jesus.NOM from the.GEN  
*oikias* ekathēto para tēn thalassan  
 house.GEN sit.IPFV.3.SG by the.ACC sea.ACC  
 ‘Going out from the house that day, Jesus sat by the sea.’ (Matt. 13.10)
- (54) *apikomenoisi de toisi theopropoisi kai mathousi pros*  
 come.AP.DAT but the.DAT messengers.DAT and learn.AP.DAT from  
*Telmēsseōn to thelei sēmainein to*  
 Telmessians.GEN which.ACC want.PRES.3.SG signify.INF.PRES the.NOM  
*teras* ouk exegeneto Kroisōi apaggeilai  
 portent.NOM not allow.PFV.3.SG Croesus.DAT announce.INF.PFV  
 ‘The messengers, arriving and learning from the Telmessians what the portent meant,  
 weren’t allowed to announce this to Croesus’ (Hdt. 1.78.2)
- (55) denique hos esse eosdem Germanos *quibus cum*  
 in short these.ACC be.INF.PRES same.ACC German.ACC who.ABL with  
*saepe numero Helvetii congressi* ... plerumque  
 often Helvetii.NOM encounter.PRFP.NOM mostly  
 superarint ...  
 vanquish.SBJV.PRF.3.PL  
 ‘(They said that) in short these were the same Germans with whom the Helvetii had  
 often had encounters and (over whom) they had mostly won’ (Caes. Gal. 1.40.7)
- (56) *hostes impeditos nostri in flumine adgressi* magnum  
 enemies.ACC hinder.PRFP.ACC our.NOM in river.ABL attack.PRFP.NOM large.ACC  
 eorum numerum occiderunt  
 they.GEN number.ACC kill.PRF.3.PL  
 ‘Attacking the hindered enemy in the river our men killed a large number of them.’  
 (Caes. Gal. 2.10.2)

Such examples give the *prima facie* impression that the shared argument is realized within the conjunct participle clause rather than the matrix, i.e. that we have backward control. All these examples share the surface structure that was given in (49), modulo the word order inside the participle clause, where we observe that the verb is not always initial.<sup>26</sup>

We already ruled out the ‘Aux to Comp’ analysis where  $NP_i$  is assigned case in the participle clause and  $\Delta_i$  is a coreferring but not controlled null argument, because the case on  $NP_i$  is consistently the case that is required in the matrix ( $\Delta_i$ ) position. We have also ruled out an analysis where the participle and the noun forms a nominal constituent because this gets the semantics wrong, cannot explain the morphological contrast in Latin and contradicts the generalization that DPs in Ancient Greek are always D-initial. This leaves us with three

<sup>26</sup> The examples illustrate a general tendency (but by no means an exceptionless rule) for the participle to be initial in its clause in Greek and final in Latin.

options, one involving backward control (57) and two involving ordinary forward control with a surface discontinuity (58).

$$(57) \quad [S_{matrix} [S_{ptcp} \dots V_{ptcp} \dots NP_{i,CASE=\alpha} \dots] \Delta_{i,CASE=\alpha} \dots V_{matrix} \dots]$$

$$(58) \quad a. \quad [S_{matrix} [S_{ptcp} \Delta_i \dots V_{ptcp} \dots NP_{i,CASE=\alpha} \dots] t_{i,CASE=\alpha} \dots V_{matrix} \dots]$$

$$b. \quad [S_{matrix} V/XP \ NP_{i,CASE=\alpha} [S_{ptcp} \Delta_i \ t \dots] \dots V_{matrix} \dots]$$

(57) illustrates the backward control analysis:  $NP_i$  originates in the participle clause and controls the matrix position  $\Delta_i$ .  $V_{matrix}$  assigns case  $\alpha$  to  $\Delta_i$  and this information flows to  $NP_i$ . If on the other hand we maintain a forward control analysis, then the (surface) structure must be discontinuous. There are two ways in which such a discontinuity could arise: One possibility is that  $NP_i$  originates in the matrix clause where it receives case and then scrambles to the participle clause, as shown in (58-a). The other possibility is that parts of the participial clause scramble across  $NP_i$ , as illustrated (58-b). On the latter analysis, the parts of the participle clause that move could either be the head (participle) itself (this would be the case in (53)), or one or more XPs from the participle clause, e.g. an NP in (56), and an AdvP in (55), where there is also a topicalized PP. These two possibilities are summed up in the notation V/XP.

However, both analyses in (58) encounter considerable theoretical difficulties faced with examples like (54), where  $NP_i$  interrupts a surface string of two coordinated participle clauses. Such structures are in fact not rare in our corpus. (59)–(61) show some examples.

- (59) *tauta akousas ho boukolos kai analabōn to*  
 this.ACC hear.AP.NOM the.NOM cowherd.NOM and take up.AP.NOM the.ACC  
*paidion ēie tēn autēn opisō hodon*  
 child.ACC go.IPFV.3.SG the.ACC same.ACC back way.ACC  
 ‘Hearing this and taking the child, the cowherd went back the same way.’ (Hdt. 1.111.1)

- (60) *sparaksan auton to pneuma to akatharton kai*  
 shake.AP.NOM him.ACC the.NOM spirit.NOM the.NOM impure.NOM and  
*phōnēsan phōnēi megalēi eksēlthen eks autou*  
 cry out.AP.NOM voice.DAT loud.DAT go out.PFV.3.SG of him.GEN  
 ‘Shaking him violently and crying out with a loud voice, the impure spirit went out of him.’ (Mark 1.26)

- (61) *His de rebus Caesar certior factus et*  
 these.ABL about things.ABL Caesar.NOM make aware.PRFP.NOM and  
*infirmiorem Gallorum veritus ... existimavit*  
 weakness.ACC Gauls.GEN fearing.PRFP.ACT.NOM ... considered.PRF.3.SG  
 ‘Being made aware of these things and fearing the weakness of the Gauls, Caesar considered ...’ (Caes. Gal. 4.5.1)

An analysis of the kind in (58-a) gives us (62-a) for examples with coordination. Here the landing site of  $NP_i$  inside a coordination is unmotivated and unparalleled. On the other hand, if we adopt the type of analysis that we see in (58-b), we get a structure like (62-b)

for examples with coordination. In this case, the coordinate structure constraint is violated, because we must assume that parts of a single conjunct moves out of the coordination.

- (62) a.  $[S_{matrix} [S_{ptcp} [S_{ptcp} \dots \mathbf{NP}_i \dots] \text{Conj} [S_{ptcp} \dots]] \dots t_i \dots]$
- b.  $[S_{matrix} V/X \mathbf{NP}_i [S_{ptcp} [S_{ptcp} \Delta_i t \dots] \text{Conj} [S_{ptcp} \dots]] \dots]$

By contrast, the backward control analysis gives us a perfectly natural structure for (54) as two coordinated participial clauses, one of which has an internal subject, as illustrated in (63).

- (63)  $[S_{matrix} [S_{ptcp} [S_{ptcp} \mathbf{NP}_i] \text{Conj} [S_{ptcp}]] \Delta_i \dots]$

Examples with coordination, then, provide an important argument for a continuous structure involving backward control, since the type of discontinuous constituency that they would involve on either of the forward control analyses is theoretically exceptional, although perhaps not impossible. Note that Danckaert (2012, p. 290) argues for Latin that the coordinate structure constraint can only be violated if the conjuncts are categorially distinct. There is no evidence for a categorial distinction in (59)–(61). It is worth noting that in examples with coordination, the overt NP always occurs in the first conjunct. This follows from the more general distributional fact that the leftmost S-adjoined participle contains the overt subject. We return to this towards the end of section 5.3.

We will now see that even disregarding the coordination issue, the type of displacement processes that must be assumed in forward control analyses such as those in (58) are unparalleled in Ancient Greek and Latin. This is the empirical core of the article. In particular, we will show that the generalization in (64) extends to participle clauses in Greek and Latin:

- (64) **Clause-bound displacement (CBD):** Displaced constituents that are not in an operator position or extraposed remain within their clause

The CBD principle is not new.<sup>27</sup> When Ross (1967/1986, p. 50ff.) suggested *scrambling* as a means of accounting for free word order in Latin, Russian, Czech etc., he claimed that scrambling can reorder any two nodes  $x$  and  $y$  on the condition that  $S_i$  dominates  $x$  if and only if  $S_i$  dominates  $y$ , i.e. scrambling is clause-bound. CBD as stated here may be more general than Ross's original proposal, for it claims that there can be *no* syntactic rule that leads to cross-clausal discontinuities except those involving operator positions or extraposition. In Greek and Latin grammar, discontinuities are traditionally lumped together under the term 'hyperbaton', but whether there is really one or several syntactic operations at work is not known. In any case, most syntactic theories operate with three broad families of discontinuities: unbounded dependencies (wh-movement and topicalization), extraposition and scrambling. Unbounded dependencies and extrapositions target well-defined positions to the left and right edges of clauses, and can give rise to discontinuities even in such fixed-word order languages as English. Scrambling is the mechanism responsible for displacement into less well-defined syntactic positions and is not available in fixed-word order languages.

To contextualize the possible discontinuity of participle clauses in Greek and Latin we will examine CBD in general in these languages, and also bring some data on discontinuous constituency in non-clausal categories. The important point, however, is whether conjunct

<sup>27</sup> It is also not uncontroversial as a universal. See e.g. Saito (1992) for an argument that Japanese has long distance scrambling.

participle clauses obey CBD.<sup>28</sup> The upshot of CBD is that any constituent that counts as a clause cannot be discontinuous. Put in other terms, if what we have so far loosely referred to as participle clauses are in fact clauses (for the purposes of CBD at least), then both analyses in (58) are impossible, since they both involve a constituent (originating in either the matrix or the participle clause) scrambling to another clause. The relevance of CBD to the question of control is therefore clear.

We will see in section 4 that there are strong indications that CBD in fact holds for conjunct participles clauses. But before we go on to argue this, we must make precise the key concept ‘displaced constituent’ (section 3.2.1), as well as provide a theory of which operator positions exist in Greek and Latin (section 3.2.2), since displacement to an operator position is exempt from the CBD.

### 3.2.1 Displaced constituents

We will consider that a constituent is displaced whenever it is separated from its head by something which is not a coargument of that head. (65) is an example of a displaced genitive.

- (65) triplicem aciem instruxit legionum quattuor veteranarum  
 triple.ACC line.ACC set up.PRF.3.SG legions.GEN four veteran.GEN  
 ‘He set up a triple line of four veteran legions’ (Caes. Gal. 1.24.2)

The genitive *legionum quattuor veteranarum* ‘four veteran legions’ belongs to the object *triplicem aciem* ‘triple line’, but is separated from it by the verb. This leads to a discontinuous NP.

We do not assume a hierarchical ordering of co-arguments, because we want to avoid assuming a specific theory of the order of major constituents in Greek and Latin. For example, we will assume that neither SOV word order nor OSV word order involves a displaced constituent. While that may be untrue, it is notoriously difficult to define a basic word order for Greek and Latin and for our purposes it does not matter. We only want to prove that displacements that are not unbounded dependencies or extrapositions are always local to the clause, and that would obviously always hold for variable argument orders, if we did consider them discontinuities.

Variable argument order also raises the questions of nonconfigurationality and the hierarchical organization of clauses in Greek and Latin. These are larger questions, and it is beyond the scope of this paper to give full answers to them, although we will have something to say in section 5. Because CBD only applies to discontinuities *across* clauses, we can abstract from the inner organization of the clause.

Finally, we should briefly address another phenomenon that can lead to discontinuities especially in Greek but also in Latin, namely clitic placement. In accordance with Wackernagel’s law, there is a strong tendency in Greek for clitics to occupy the second position in the sentence even if this means breaking up a phrase, as in (66), where the clitics have been italicized and the interrupted NP bracketed.

<sup>28</sup> A point of terminology here: We take it that there is potential variation in what kind of clauses CBD apply to, but not in what subparts of a clause it applies to. That is, if CBD applies to a particular type of clause, then no parts of that clause can scramble into another clause. Hence, if we say that ‘participle clauses obey CBD’, this means that subparts of the participle clause cannot scramble out of it, *not* that participle clauses qua subparts can themselves scramble out of their clauses. Similarly, ‘infinitive clauses violate CBD’ means that subconstituents of an infinitive clauses can scramble out of it.



- (66) [hoi gar me ek tēs kōmēs paides] ... paizontes  
 the.NOM for I.ACC from the.GEN village.GEN children.NOM play.PP.NOM  
 spheōn autōn estēsanto basilea  
 they.GEN self.GEN make stand.PFV.MID.3.PL king.ACC  
 ‘For the children from the village, while playing, chose me as their king’ (Hdt. 1.115.2)

Here the two clitics *gar* and *me* occur between the article *hoi* and its NP, thus creating a discontinuous phrase. It is widely believed that such discontinuities are of a different nature than those not involving clitics, even if the latter ones may also have a prosodic motivation (Agbayani and Golston 2010). For the purposes of this article, we will simply ignore discontinuities that stem from clitic placement. For a full treatment of clitics in Classical Greek, see Goldstein (2016).

### 3.2.2 Operator positions in Greek and Latin

Since our aim is to test CBD in a corpus, and CBD makes an exception for operator displacement, we must define what operator positions there are in Greek and Latin in a precise enough way for us to be able to find these in the corpus.<sup>29</sup>

In other Indo-European languages (and many non-Indo-European languages too) operator positions are typically found in the left periphery of the clause: and ever since the first generative analyses, operators have been assumed to sit in positions such as (in modern terms) spec,CP or to be (left-)adjoined to CP. There is no reason to believe that Greek and Latin differ from this pattern. One of the few generalizations about Greek and Latin clause structure that hold almost without exception is that typical operators such as interrogatives and relatives must always be clause-initial, as shown in (67)–(70). The sole exception to this pattern occurs whenever there is a topicalized constituent which precedes the operator, as in (71).<sup>30</sup>

- (67) limnē ... [tēni legousi Ludoι [ \_i aeinaon  
 lake.NOM which.ACC say.PRES.3.PL Lydians.NOM ever-flowing.ACC.  
 einai]]  
 be.INF.PRES  
 ‘a large lake ... , which the Lydians say is fed by eternal springs’ (Hdt. 1.93.5)
- (68) [tina thelete apo tōn duo [apolusō \_i  
 who.ACC desire.PRES.2.PL from the.GEN two set free.SBJV.PFV.1.SG  
 humin]]  
 you.DAT  
 ‘Which of the two do you desire that I set free for you?’ (Matt. 27.21)
- (69) Commius Atrebas venit [quem supra demonstraveram [ \_i a  
 C. A.NOM come.PRF.3.SG who.ACC above show.PPF.1.SG from  
 Caesare in Britanniam praemisum]]  
 Caesar.ABL in Britannia.ACC send before.PRFP.ACC

<sup>29</sup> CBD also makes an exception for extrapositions, but these are rare and also hard to identify automatically, since the plausibility of an extraposition analysis in many cases depends on factors such as the ‘weight’ of a constituent. Therefore we will deal with extraposition manually rather than in the automated corpus query. The three relevant examples are shown in (82).

<sup>30</sup> For illustration, the gap has been marked with *\_i* (except in (71) which is a local subject question), although we cannot reliably assign it a position within its clause.

‘Together with these legates came Commius Atrebas whom I have shown above was sent to Britannia beforehand’ (Caes. Gal. 4.27.2)

- (70) Haeduos [*quorum*<sub>i</sub> antiquitus erat in fide civitas <sub>i</sub> ]  
Aedui.ACC who.GEN from old times be.IPFV.3.SG in alliance.ABL state.NOM  
‘the Aedui, whose state is from old times in alliance (with Rome)’ (Caes. Gal. 6.4.2)

- (71) tas d’ emas tukhas *tis* ar’ Akhaiōn ē tis  
the.ACC but my.ACC fate.ACC who.NOM PARTICLE Achaean.GEN or who.NOM  
Ellēnōn ekhei  
Greek.GEN have.PRES.3.SG  
‘What Greek or what Achaean holds my destiny?’ (Euripides, Troads 292-3)

Although Greek and Latin unbounded dependencies are less constrained than English ones (e.g. (70) displays subextraction from a subject), they are similar in that the filler occurs in a position leftmost in the clause (CP). This holds not only in relativization, but also in topicalization of non-*wh*-words, cf. (72), which again involves subextraction from a subject.

- (72) illorum vides quam niteat oratio  
they.GEN see.PRES.2.SG how shine.SBJV.PRES.3.SG speech.NOM  
‘(you argue squalidly, while) you see how *their* speech shines’ (Cic. Fin. 4.III.5)

There is in fact clear evidence that the position in question is to the left of the C head, for Greek and Latin license unbounded dependencies in embedded clauses with a complementizer. This is shown in (73)–(76) for Greek, and (77) for Latin. In these examples, the embedded CP is bracketed and its C head italicized.

- (73) ou gar ēn deinon [kata touto *mē* halōi kote]  
not for be.IPFV.3.SG fear.NOM along this.ACC that seize.PFV.3.SBJV ever  
‘For there was no fear that anyone could ever seize it along this (route).’ (Hdt. 1.84.2)
- (74) gnōmēn ... khrēsīmōtatēn, [tēi *ei* epeithonto],  
advice.ACC useful.SUPL.ACC which.DAT if follow.IPFV.3.PL  
pareikhe an sphi eudaimoneein Hellēnōn malista  
be possible.IPFV.3.SG PARTICLE them.DAT prosper.INF.PRES Greek.GEN most  
‘(Panionion gave them) most useful advice and if they had followed it, it might have been possible for them to prosper the most of all Greeks’ (Hdt. 1.170.1)
- (75) hapantes gar eikhon ton Iōannēn [ontōs *hoti* prophētēs  
all.NOM for held.IPFV.3.PL the.ACC John.ACC really that prophet.NOM  
ēn]  
be.3.SG.IPFV  
‘Everyone held that John really was a prophet.’ (Mark 11.32)
- (76) erōtēsō humas kagō logon hena, [hon *ean*  
ask.FUT.1.SG you.ACC I too.NOM word.ACC one.ACC which.ACC if  
eipēte moi] kago humin erō en poiāi  
say.PFV.SBJV.2.PL me.DAT I too.NOM you.DAT say.FUT.1.SG in which.DAT  
exousiāi tauta poiō  
power.DAT this.ACC do.PRES.1.SG  
‘I also will ask you one question, and if you answer it, then I also will tell you by what authority I do these things.’ (Matt. 21.24)

- (77) [quod si fecerit], Haeduorum auctoritatem apud omnes  
 which.ACC if do.PRF.SBJV.3.SG Aedui.GEN influence.ACC among all.ACC  
 Belgas amplificaturum  
 Belgian.ACC increase.FUT.PTCP.ACC  
 ‘If he did this, he would increase the influence of the Aedui among all the Belgae’  
 (Caes. Gal. 2.13)

In (73) and (75) a constituent (AdvP and PP respectively) of the embedded clause has been fronted to a position before the complementizer. On the most natural analysis they are topicalized within the embedded clause. Similarly, the relative pronouns *tēi* in (74), *hon* in (76) and *quod* in (77) occur to the left of the complementizer.

Notice that Greek and Latin are not exceptional in allowing relative pronouns in (island) clauses with overt complementizers. Truswell (2011, p. 295) notes that such structures are allowed in at least Medieval Italian, Early Modern Dutch, Bavarian German and Hindi, as well as Early Modern English, for which he provides a detailed analysis. (78) shows an example from Bavarian (Felix 1985, p. 177)

- (78) das ist der Wein [[den wenn ich \_ trink], krieg ich Kopfwegh]  
 this is the wine which if I drink get I headache  
 ‘This is the wine which I get a headache if I drink’

Finally, I note for completeness that in Greek and Latin it is even possible, although very rare, to find *multiple* topicalizations in front of the complementizer, as in (79), and topicalized element in front of an interrogative (see Thomson 1939), as in (80) from Greek.

- (79) tuphlos de tuphlon ean odēgēi, amphoteroi eis bothunon  
 blind.NOM but blind.ACC if guide.PRES.SBJV.3SG, both.NOM in pit.ACC  
 pesountai.  
 fall.FUT.3.PL  
 ‘And if a blind man guides a blind man, both will fall into a pit.’ (Matt. 15.14)

Such examples, along with cases like (71) where there is topicalization to a position in front of a *wh*-phrase suggest that *wh*-phrases are in spec,CP while topicalized elements are adjoined to CP. But for our purposes, we need not define the exact positions involved: what is important for us is that the leftmost element in a clause is potentially in an operator position, even when it precedes a complementizer, and even if it apparently violates island constraints. As such, discontinuities involving clause-initial elements, such as (72), do not form exceptions to the CBD, but are instances of operator displacement (topicalization).<sup>31</sup>

## 4 A corpus study of phrase structure and control in Greek and Latin

### 4.1 Preliminaries

We will now test whether CBD holds for a variety of clause types in a corpus. How can we best do this? The general principle is clear: If we find that a large number of clauses of a particular type do not violate CBD, we may be willing to grant that CBD is a real constraint on such clauses. Unfortunately, it is not easy to test the claims statistically. For

<sup>31</sup> Similarly, recursive topicalizations as in (79) do not involve CBD violations, but they are in any case vanishingly rare.

example, we will see that our corpus has 1196 finite clauses from Herodotus: 11 of these are discontinuous because some element has been displaced to an operator position. None are discontinuous in violation of CBD. This distribution is intuitively a quite strong result in favour of CBD holding for finite clauses, but we cannot test it for significance without comparing it to the distribution we would expect if CBD does not hold for finite clauses, as we do not know what that distribution would be. We can, however, make some guesses based on the rate of discontinuity in other categories, and we will see that such comparisons validate our intuitions.

How do we test the CBD in the potential backward control cases, the conjunct participle clauses? Should we count examples like (53)–(56) as continuous, based on the analysis in (57), which assumes an *internal subject* for the participle clause? Or should we count them as discontinuous, based on either of the analyses in (58), which both assume an *external subject* and a discontinuous participle clause.

The solution is to look at data based on both analyses, the internal and the external subject hypothesis. If we find participle clauses that are discontinuous on both analyses, i.e. participle clauses that are ‘interrupted’ by other material than the controller, we have falsified CBD for participle clauses. If on the other hand all participle clauses are continuous on the internal subject analysis, we have evidence that CBD holds for participle clauses. For in that case, it is only the controller that can interrupt the participle clause. As we will see, neither of the analyses in (58) can account for that. If the discontinuity results from a matrix element scrambling into the participle clause (58-a), it remains mysterious why only the controller can do this. And if the discontinuity results from the parts of the participle clause scrambling leftwards (58-b), it is unclear why these parts can only cross the controller. None of these restrictions on discontinuity can be justified, as we will see. Moreover, it is suspicious on theoretical grounds that they have to be stated in terms of the controller rather than some specific matrix position – recall that the controller can have a variety of roles in the matrix clause.

The crucial point, then, is to note that the combined hypothesis that CBD holds for participle clauses and that these can have internal subjects makes a strong prediction about the continuity of participle clauses: only the controller can interrupt the participle clause in the surface syntax and this interruption is only apparent, since the controller in fact originates in the participle clause. Since CBD is a restrictive theory of discontinuities, it cannot ever be proven to hold for any type of clause in dead languages like Greek and Latin. But we will see that it can be made very likely through large-scale corpus studies. As a restrictive theory with no counterexamples, it should be our preferred theory of Greek and Latin discontinuities.

#### 4.2 The corpus

To test CBD – and the possibility of discontinuity in various types of constituents more generally – in an effective manner, we need a treebank, i.e. a corpus that is marked up with syntactic analysis. There are two such corpora available for Greek and Latin, the PROIEL corpus (Haug and Jøhndal 2008; Haug et al. 2009) and the Ancient Greek and Latin dependency treebanks (Bamman and Crane 2011). However, the latter resource is focused on poetic texts and in any case uses a style of annotation for control structures which is not rich enough for our purposes, because it does not identify the controller. So we are left with the PROIEL corpus.

The PROIEL corpus was manually annotated with dependency structures. For the purposes of this research the dependency structures were transformed into phrase structures us-

Author	No. words analyzed in corpus	No. of words total
Herodotus	12421	185097
Caesar	22414	52207
Gospels	64519	64519

**Table 1** Texts used in the corpus study

ing the algorithm described in Haug (2012). No particular theoretical importance attaches to the specific structures generated by this algorithm; the phrase structures are simply a means to calculate the frequency of discontinuities and group them into operator displacements and others.

The conversion to phrase structure is fully automatic and involves no interpretation of the examples. Any discontinuity involving a displaced element at the left edge of a clause is counted as an unbounded dependency because, as we have seen, such examples cannot count as evidence for cross-clausal discontinuity. Notice that for each particular discontinuous phrase, it was assumed the overt position of the head is the base position of its maximal projection; all other elements were considered displaced.

At the time of performing this corpus study, the PROIEL corpus contained the Greek New Testament and the Latin Vulgate translation, as well as representative samples from Herodotus and Caesar. The Vulgate translation was discarded as unsuitable for this kind of research, especially since its word order is heavily influenced by the Greek original. The other texts offer suitable samples of the Ionic dialect of Classical Greek (Herodotus), Koine Greek (The New Testament), and Classical Latin (Caesar), see table 1. Although these subcorpora are of different sizes, care has been taken to perform statistical tests to show that results are significant within each subcorpus. So although the NT is the dominant text in terms of numbers of words, the results reported here are equally valid for Herodotus and Caesar.

It should be stressed in this regard that the common opinion of scholars today is firmly in favour of seeing NT Greek as a regional variety of the vernacular Greek of the Hellenistic world, i.e. Syro-Palestinian Greek (Janse 2007; Joosten 2013; Horrocks 2010), “a reasonably close reflection of the everyday Greek of the majority of the literate population in the early centuries AD, subject, as always, to the influence of the ordinary written language of business and administration learned in school” (Horrocks 2010, p. 147). This regional variety may have been influenced by Semitic – no doubt because of widespread bilingualism in the region – but there is no such thing as “Jewish Greek” or “Biblical Greek” (de Lange 2007). There is also no reason to believe that the Gospels were originally written in any other language than Greek, or that the authors were not native speakers (Joosten 2013).

Moreover, the comparison between Herodotus and NT Greek gives an interesting diachronic dimension to our analysis, which will be seen to corroborate the analysis given here. In the later stage of Greek represented here by the NT, the tendency was to move away from discontinuous constituency and towards fixed structures. However, we will see that there is no observable difference in the use of the apparent backward control structures. This is in itself an argument against treating these structures as normal discontinuities.

The Latin part of the corpus has been included because it is interesting to observe that participles behave essentially the same in the two languages. There is no reason to believe that the Latin syntax is influenced by Greek. So there is a potential implication here for the reconstruction of Indo-European participial syntax. We must await a thorough examination

	Caesar			Gospels			Herodotus		
	op	no-op	cont	op	no-op	cont	op	no-op	cont
AdjP	9	56	156	3	46	336	2	20	122
AdvP	1	52	171	0	14	223	5	9	45
NP	129	299	2681	48	175	5171	28	137	926
PP	2	28	1841	2	17	4422	1	21	702

**Table 2** Discontinuities in lexical categories

	Caesar			Gospels			Herodotus		
	op	no-op	cont	op	no-op	cont	op	no-op	cont
CP	3	0	707	7	0	1381	1	0	209
IP	75	0	2656	33	0	9861	11	0	1185
Infinitive clause	30	85	817	72	36	698	45	64	342
Complement ptcp. clause	3	10	123	3	6	202	1	10	42
Absolute ptcp. clause	1	3	424	0	0	167	0	0	91
Conjunct ptcp. clause (ext. subj.)	12	11	221	2	48	1258	5	16	515
Conjunct ptpc. clause (int. subj.)	0	1	243	0	0	1308	3	2	531

**Table 3** Discontinuities in clausal categories

of (at least) Vedic, the other IE branch to attest a widespread use of the inherited participle, before we can conclude whether this is inherited syntax or parallel innovation.

#### 4.3 Discontinuous constituency in the corpus

Table 2 shows the number of continuities (cont) and discontinuities in lexical categories in the three texts that we have analysed. Discontinuities are divided in two groups depending on whether the displaced material is in an operator position (op) or not (no-op). Only multi-word phrases were counted, since single-word phrases are trivially continuous.

We see that the projections of adjectives show the highest degree of non-operator discontinuity. In Caesar, for example, we have (ignoring the odd operator displacement) 56 discontinuous APs for 156 continuous ones: this is a discontinuity rate of more than 25%. However, it should be noticed that most occurrences of adjectives are single-word phrases and hence not counted at all in our data. The ones that do consist of more than one word are typically the ones with a clausal argument (such as Grk. *axios* ‘worthy’, Lat. *certus* ‘certain’) and the intruder is in most cases the copula. AdvPs behave in a similar way. For NPs, we find a more limited but still important number of discontinuous phrases: again ignoring operator displacements, we have 299 discontinuous NPs for 2681 continuous ones in Caesar, and 137 discontinuous NPs for 926 continuous ones in Herodotus. That is around 10% NP discontinuity in both texts. In the Gospels, on the other hand, we have only 175 discontinuous NPs for 5170 continuous ones, so the non-projectivity rate is only 3.2%. Prepositional phrases show the highest degree of continuity and also resist operator discontinuities.<sup>32</sup>

<sup>32</sup> Note, however, that we have assumed that P projects a specifier, in line with Devine and Stephens (2000, 2006), although we do not assume that this specifier can contain material functionally external to the PP. There is strong reason to think that groups such as *qua de causa*, lit. ‘which from cause’, i.e. ‘from which cause, why’ form single maximal projections. This is only possible if *qua* is in a specifier position in P, since *de* is never a postposition. Hence, *qua de causa* contains a discontinuous NP, but the PP is itself continuous. If P does not have a specifier, more PPs should be counted as discontinuous.

Table 3 shows discontinuity in the clausal domains, which are the more interesting ones for our purposes. CPs were counted as one group and IPs (finite clauses) as another, consisting of the verb and all its arguments and modifiers. In most cases the CP will embed an IP. If an element from the IP has been fronted directly to the left of the complementizer head as in (73)–(77), the CP will remain continuous, but the embedded finite clause is discontinuous from the extraction and thus counted as a discontinuity involving an operator position. Infinitive clauses are a heterogeneous group consisting of both accusative with infinitive-structures, i.e. infinitive structures that can host an overt subject, and control/raising infinitives with no overt subject. We will look closer at the control/raising infinitives below. Participial clauses have been split into four groups: absolute participles (with an internal subject), complement participles (without subject) and conjunct participles (with two analyses, following the external and the internal subject hypotheses).

The ‘no-op’ columns are the crucial ones in Table 3 as they track the number of examples where the CBD is violated in a particular, (potentially) clausal domain. We see that there are *no* such violations in the finite clausal domains (IP and CP), although the number of examples is very high. This strongly suggests that CBD holds for all finite clauses.<sup>33</sup>

In the non-finite domains, things look different. It is clear that CBD does not hold for infinitives, as was also noticed in the previous literature: infinitive clauses are discontinuous in 5–20% of the cases. It is likely that this is due at least in part to restructuring effects (Butt 1995; Wurmbbrand 2001; Cinque 2006; Grano 2015), i.e. the infinitive and its governing verb forming a single, monoclausal domain.<sup>34</sup>

As for participles, they behave in the same way as infinitives when they are used in complementation: discontinuities are allowed. Absolute constructions (where the participle clearly takes an internal subject, see section 3) are continuous in Greek, whereas in Latin, there are some (very rare) examples that appear to show that CBD does not hold for absolute constructions. One of the three counterexamples are shown in (80).

- (80) *Cognita Caesar causa reperit ...*  
 learn.PRFP.ABL Caesar.NOM case.ABL find out.PRES.3.SG  
 ‘Having learnt about the case, Caesar finds out ...’ (Caes. Gal. 6.9.8)

One possible explanation for why Latin absolutes can sometimes be discontinuous is that they have been reanalyzed as NPs. There is independent evidence for this reanalysis from the so-called ‘dominant participle’ construction (Nikitina and Haug 2015), in which a constituent of a noun and a participle looks like and has the distribution of an NP, but has clausal semantics, cf. (81).

- (81) *ante exactam hiemem*  
 before expel.PRFP.ACC winter.ACC  
 ‘before the winter expired’ (not ‘before the expired winter’) (Caes. Gal. 6.1)

‘Dominant participle’-constructions can occur in a number of functions (subject, object, etc.), and the ablative absolute in fact looks like an adverbial dominant participle. This may have triggered a reanalysis of *cognita causa* in (80) as an NP, with consequent licensing of

<sup>33</sup> We can test this claim for example by comparing IPs and CPs to PPs, the lexical category that allows the least discontinuity. The difference to PPs is statistically significant at  $p < 0.05$  (and much lower than that for all cases except CPs in Herodotus, where the dataset is relatively small) for both IPs and CPs in all the three texts (Two-sided Fisher’s exact test).

<sup>34</sup> A more fine-grained analysis could possibly reveal differences between different infinitival structures, but we cannot go into that here.

discontinuity. We must stress that discontinuous ablative absolutes are exceptional and liable to a special explanation. Their exceptional status is confirmed by a preliminary examination of Cicero's letter to Atticus, a text that is currently being added to the PROIEL treebank. This text contains 94 absolutes, all of which are continuous.

Finally, we come to the group of participles that are the focus of our interest, the conjunct ones, which share an argument with their matrix. Table 3 shows that these violate CBD in 3-4% of the examples in all the three texts (75 examples) if we assume an external subject. However, if we assume an internal subject, only three discontinuities remain.<sup>35</sup> These are shown in (82). The examples have been bracketed for expository convenience, although there is considerable uncertainty as to the exact correct analysis. In each case there is a clause  $S_{ptcp}$  headed by the participle (boldfaced) which is an adjunct in a larger clause  $S_{mat}$ , and there is material (italicized) that belongs in the participle clause but appears at the edge of  $S_{mat}$ , separated from the rest of  $S_{ptcp}$ .

- (82) a.  $\bar{o}$  despota [[**easas** me] $_{S_{ptcp}}$  khariei malista] $_{S_{mat}}$   
 o lord.VOC allow.AP.NOM I.ACC please.FUT.MID.2.SG most.SUPL  
*ton theon tōn Hellēnōn ... epeiresthai*  
 the.ACC god.ACC the.GEN Greeks.GEN ask.INF.PFV.MID  
 'Lord, you will please the most by allowing me to ask the god of the Greeks. ...'  
 (Hdt. 1.90.2)
- b. [ei de khreon esti [tekmairōmenon] $_{S_{ptcp}}$  legein] $_{S_{mat}}$   
 if but necessary.NOM be.PRES.3.SG judge.PP.MID.ACC say.INF.PRES  
*toisi nun eti eousi Pelasgōn ... hoi*  
 the.DAT now still be.PP.DAT Pelasgi.GEN ... who.NOM  
 'If it is necessary to pronounce on this matter judging by the still remaining  
 Pelasgians ... who ...' (Hdt. 1.57.1)
- c. reliquos in fugam coniecerunt atque [[ita  
 remaining.ACC to flight.ACC throw.PRF.3.PL and so  
**perterritos** $_{S_{ptcp}}$  egerunt] $_{S_{mat}}$  *ut non prius fuga*  
 frighten.PTCP.PRF.ACC drive.PRF.3.PL that not before flight.ABL  
*desisterent quam ...*  
 stop.SBJV.IPFV.3.PL than  
 'They put the rest to flight, and drove them forward so frightened that they did  
 not stop before. ...' (Caes. Gal. 4.12.2)

These three counterexamples to CBD for participles form a coherent group. The displaced material is in each case a rather long clause (more than ten words, abbreviated here). Right extraposition of such heavy arguments is of course a well known phenomenon in other languages too (in particular in correlative structures such as (82-c)), so these examples do not invalidate the claim that conjunct participle clauses are basically continuous. Extraposition is normally thought to be clause-bound (the Right Roof Constraint, Ross (1967/1986)), but in (82), the extraposed elements seem to escape from their (nonfinite) clauses. Similar effects are found in English: *I have wanted [to know \_\_\_] for many years exactly what happened to Rosa Luxembourg* (Andrews 1975). We tentatively conclude that nonfinite clauses do not block extraposition in Greek and Latin, though more detailed studies are obviously needed. Observe also that in (82-c), the stative semantics of the participle suggests an adjectivization

<sup>35</sup> Another potential example comes from the Gospels (Luke 18.14), but involves a serious problem of textual transmission.



of the participle, in which case it may not be clausal at all, and so there would be no violation of CBD.

In conclusion, then, the numbers in table 3 prove beyond reasonable doubt that participle clauses can only be interrupted by their controller. The three cases of extraposition apart, there are no counterexamples, even though the number of cases is large (more than 200 even in the smallest corpus, Caesar, and more than 1000 in the Gospels). This gets a natural explanation on the backward control hypothesis, because the controller is actually internal to the participle clause and the interruption is only apparent. That does not yet prove that we must have backward control, but it leaves the alternative hypotheses with the problem of accounting for the restriction on interrupting elements to the controller. The problem takes a different form depending on whether we assume that parts of the matrix clause scramble into the participle clause (58-a), or that parts of the participle clause scramble out of it (58-b).

Let us consider the latter hypothesis first. On that analysis, we need to account for why the scrambling parts of the participle clause can only cross the controller and never scramble further away. One could adduce the parallel of the oft-found pattern in hyperbaton, whereby a dependent breaks up and distributes around its head, as in (83)–(84), where the discontinuous constituent has been italicized.

- (83) *phōs eiden mega*  
light.ACC see.PFV.3.SG great.ACC  
'(the people) saw a great light' (Matt. 4.16)
- (84) *sine eius offensione animi*  
without he.GEN offense.ABL feeling.GEN  
'without offense to his feelings' (Caes. Gal. 1.19.5)

However, although the above pattern is the most common, it is easy to find other types. In particular, the intervenor need not be the head of the discontinuous constituent, and importantly, it is possible for more than one constituent to intervene, as shown in (85)–(86).

- (85) *potamoi ek tēs koilias autou rheusousin hudatos*  
rivers.NOM from the.GEN belly.GEN him.GEN flow.FUT.3.PL water.GEN  
*zōntos*  
live.PP.GEN  
'Rivers of living water will flow from his belly' (John 7.38)
- (86) *publice maximam putant esse laudem ...*  
as.a.nation greatest.ACC esteem.PRES.3.PL be.INF glory.ACC  
'As a nation, they esteem their greatest praise to be that ...' (Caes. Gal. 4.3.1)

These examples show that the typical cases of scrambling are *not* constrained to crossing a single constituent. Nor are there constraints on the syntactic relationship between the discontinuous constituent and the constituents that split it up. In (86) there is not only a discontinuous NP, but as a consequence there is also a discontinuous infinitival clause, split in two by its governing head *putant*, but as we will see later in (87)–(88), there can be other intruders in infinitival clauses, contrary to what we see in participle clauses. Similar facts also emerge clearly from the thorough studies of Greek and Latin discontinuous constituency in Devine and Stephens (2000, 2006): there are tendencies, but no hard constraints on the intervening material.<sup>36</sup> This means that the postulated discontinuous structures in participle

<sup>36</sup> A reviewer objects that we should "talk about possible landing sites of the displaced part rather than about the intervening material, which is always going to be very surface-oriented". That is of course true and

clauses would be very different from other discontinuities, and the analysis in (58-b) has no account for that difference. The constraint on intervening material would have no parallel in other cases of discontinuous constituency and moreover, it is suspicious on theoretical grounds that the constraint must be expressed in terms of control (the scrambling part of the participle clause can only cross its controller), rather than in terms of a fixed position in the matrix clause. (Recall that the controller can have several different functions (subject, object, oblique) in the matrix.)

On the analysis in (58-a), which assumes that a matrix constituent scrambles into the participle, a similar problem arises. Why can only the controller scramble into the participle clause? From a purely syntactic point of view there is no obvious way to restrict discontinuities in this way, except by taking into account the syntactic relationship between the participle and its subject, which leads to the subject-internal interpretation. From a pragmatic point of view one could still entertain that a conjunct participle and its matrix form a domain within which scrambling is possible, but for pragmatic reasons, it is only the controller that has a motivation for being placed close to the participle. This would be an instance of Behaghel's law (what goes together semantically goes together in the word order, Behaghel 1932, p. 4–7).

There are a number of objections one could raise against such a theory. First, it is in the nature of non-operator displacements to violate Behaghel's law for (often very slight) discourse reasons. If there was no hard constraint against the discontinuity of participle clauses, it seems unlikely that we do not observe this exploited for example for prosodic reasons or simple embellishment as happens with discontinuities in other categories. Second, this explanation reduces a categorical effect to be the result of a statistical tendency, Behaghel's law. Categorical explanations for categorical facts should take precedence for methodological reasons.

Statistical analysis also suggests that the pragmatic account that is needed to make either analysis in (58) work, is wrong. To properly evaluate that theory, we need to compare the observed distribution of discontinuities in our data with the theoretical distribution that the pragmatic hypothesis would predict, to see how (un)likely it is that our observed data could be sampled from such a population. Unfortunately, it is not clear what that theoretical distribution is – that would require far better knowledge of Greek and Latin word order than we currently have.

We can, however, compare conjunct participles to control infinitives, which are similar in that their subjects are also arguments of the matrix clause. In table 3 these were grouped with other infinitive constructions like the accusative with infinitive, which has a separate subject. Table 4 shows discontinuities in control infinitives only, as compared with conjunct participles (on the external subject analysis, where these can be discontinuous).

	Caesar			Gospels			Herodotus		
	op	no-op	cont	op	no-op	cont	op	no-op	cont
Conjunct ptcp.	12	11	221	2	48	1258	5	16	515
Control inf.	19	44	261	35	15	336	12	23	77

**Table 4** Discontinuities in control infinitives and conjunct participles

it is precisely the point we make: The promiscuity of intervening material in ordinary syntactic discontinuities in Greek and Latin makes it unlikely to say the least that a successful theory can be based on the intervening material. This contrasts with participle clause discontinuities where there is a total lack of such promiscuity; this is an essential fact that the theory must account for.

The first observation we can make is that even if we assume that conjunct participles have external subjects and can be discontinuous, they are much less prone to be discontinuous than control infinitives, and the difference is significant at  $p < 0.001$  (Fisher's exact test) for all three texts. This fact in itself has no clear explanation if we assume that both infinitives and participles form domains within which discontinuities are freely licensed.

Furthermore, we can look closer at the cases where there are discontinuities and analyse what types of intruding material that we find. Apart from the three extrapositions in (82), only subject intrusions are found in conjunct participle clauses. In control infinitives, by contrast, we find the verb subcategorizing for the infinitive clause intruding in it in (86). It is also possible to find examples where the infinitive clause is interrupted by the subject (87), or by both the governing verb and the subject (88).<sup>37</sup>

- (87) ... ut iam [ad vallum castrorum *hostes* accedere]  
 that now to wall.ACC camp.GEN enemies.NOM approach.PRES.INF  
 auderent  
 dareIPFV.SBJV.3.PL  
 'that the enemies now dared to approach the wall of the camp' (Caes. Gal. 3.15.10)
- (88) pothen [toútous *dunēsetai tis* hōde khortasai ...]  
 whence these.ACC be.able.FUT.3.SG someone here feed  
 'How could someone feed these people here?' (Mark 8.4)

Notice that the bracketing in (87)–(88) merely serves to show the surface extent of the infinitive clause. The intervening material is italicized. As with participle clauses, we only look at examples where the potentially displaced part is not in an operator position, although we cannot in principle exclude multiple operator movement. Here again we focus on the intervening material precisely to show that it is variable and hence not likely to be part of the explanation; this contrasts sharply with the situation in participle clauses. Table 5 shows the frequency of the various intrusion types in conjunct participles and in control infinitives in the three authors in our corpus.<sup>38</sup>

source	structure	external	head	head-and-subject	subject
Caesar	conjunct ptcp.	0	1	0	10
	control inf.	16	13	1	14
Gospels	conjunct ptcp.	0	0	0	48
	control inf.	3	6	1	5
Herodotus	conjunct ptcp.	1	1	0	14
	control inf.	4	17	1	1

**Table 5** Intrusion types in conjunct participles and control infinitives

<sup>37</sup> There are even some cases where the corpus analysis suggests that material without functional affinity to the infinitive clause nevertheless intrudes in it (shown as 'external' in table 5), although on closer inspection these are all cases where the adverb attachment in the corpus analysis could be doubted as in (i).

(i) [id ex itinere magno impetu Belgae oppugnare] coeperunt  
 it.ACC from march.ABL great.ABL vigor.ABL Belgae.NOM attack.PRES.INF begin.PRF.3.PL  
 'This the Belgae on their march began to attack with great vigor.' (Caes. Gal. 2.6.1)

If *ex itinere* 'on their march' is taken to modify the matrix verb rather than the infinitive it interrupts the infinitive clause.

<sup>38</sup> The differences between control infinitives and conjunct participles are significant at  $p < 0.005$  (Fisher's exact test) in all authors.

The results are striking. Even though we do find subject intruders in infinitive clauses, they are by no means as dominant as in participle clauses.<sup>39</sup> By contrast, intruding heads are common and in fact dominate in the Greek material, and perhaps in the Latin material if it is true that the attachment of adverbials in the corpus overstates the importance of functionally external material intruding in infinitive clauses. This is interesting because head intrusion is the most common pattern in other discontinuous categories too (Agbayani and Golston 2010, p. 135). In other words, discontinuous control infinitives look like non-operator discontinuities in general, with the dominant but not at all exclusive pattern being that X is interspersed with dependents in XP. Discontinuous participle clauses look nothing like this, and that is a problem for both types of analysis in (58), since they both assume a discontinuous participle clause, although they differ in the way they derive the discontinuity.

On a purely pragmatic account, it is not clear why control infinitives would show more discontinuities than conjunct participle clauses, nor why the discontinuities would be of a different type. On a syntactic account, we have a number of possible explanations: First, it seems likely that at least some of the infinitive structures (involving modal verbs such as Lat. *possum*/Gk. *dunamai* 'can' or Lat. *volo*/Gk. *(e)thelomai* 'want') are monoclausal by restructuring, which would directly predict that there is no infinitive clause and CBD does not apply. Second, the adjunct/complement distinction is likely to be important – recall that complement participles can be discontinuous. Similarly, control infinitives, being complements, would show more discontinuity than the conjunct participles, which are adjuncts. Third, there could be differences in the structures that infinitives and participles project.

Finally, we can add that the assumption of discontinuities in participle clauses runs against the general diachronic evolution. Tables 2–3 show clearly that the frequency of discontinuous AdvP, NP, PP and infinitival clauses drop significantly from Herodotus to the gospels.<sup>40</sup> By contrast, analyses involving a discontinuous participle clause would have to assume that this particular type of discontinuity *increased* from Herodotus to the Gospels, contrary to what the data from the other categories would lead us to expect, and contrary to the general tendency of the Greek language to increase the use of continuous structures (see e.g. Devine and Stephens 2000, p. 142–153). It is true that there are also synchronic factors of variation (genre, style, dialect) between Herodotus and the NT. Nevertheless, it is hard to see how these could account for the differences observed between participles and other constituents unless the underlying structures are different.

In summary then, while the analyses in (58) differ in the way they account for the crucial data, they both involve a syntactic discontinuity, and they both encounter similar problems for that reason. (1) They both have problems with accounting for the discontinuities that involve coordination. (2) They must both stipulate that discontinuity of participle clauses is constrained in ways that are unparalleled in other discontinuities allowed by Greek and Latin grammar. (3) They must both assume that controlled participle clauses behave very differently from controlled infinitival clauses (which do behave like other discontinuous constituents). (4) They must both assume that the type of discontinuities they posit to maintain a forward control analysis became *more* common in from Herodotus to NT Greek, while other discontinuities became *less* common.

<sup>39</sup> Recall that we analyzed the three cases of non-subject intruders in participle clauses that we see in these tables as instances of right dislocation.

<sup>40</sup> Using a two-sided Fisher's exact test, we get  $p < 5 \times 10^{-9}$  for NP, PP and infinitival clauses, and  $p < 0.5$  for the much less frequent AdvP and complement participle clauses. AdjP shows a similar tendency, but the numbers are not significant. This could be due to the low numbers. However, discontinuous AdjP often involve an infinitival clause that could be extraposed (see the discussion at the beginning of this section), so there could also be a linguistic reality behind the numbers.

In conclusion, then, the corpus data shows that CBD holds for conjunct participles, as it also holds for CPs, IPs and absolute participle clauses. This means that the analysis in (57) must be right and we have backward control. Moreover, we observe that backward control is a reasonably common phenomenon. The table in 3 could give the impression that backward control is a rare phenomenon, found in 3-5% of participle clauses. But it should be kept in mind that the numbers are skewed because of the large amount of examples where the participle's subject is a null argument (prodrop) and does not occur overtly at all. Table 6 shows the distribution of control type in the three texts, only counting the examples where the controller is overt. Note that the most common position for the participle's subject is on the edge of the participle clause, which means that we cannot see whether we have forward or backward control. Among the non-ambiguous cases, we see that in Caesar there is an almost equal number of clear cases of backward and forward control; in the NT and Herodotus there are relatively fewer cases, but still 20-30%.<sup>41</sup>

author	control type	freq
Caesar	ambiguous	109
	backward	22
	forward	25
Gospels	ambiguous	525
	backward	59
	forward	156
Herodotus	ambiguous	157
	backward	25
	forward	94

**Table 6** Control types per author

## 5 Analysis

### 5.1 Word order in LFG

The data in section 4 leads us to the conclusion that Greek and Latin participles project structures that are obligatorily continuous. This means that whenever the participle's subject occurs inside other material from the participle clause, it is structurally part of the participle clause. However, we saw in section 3 that it receives case in the matrix clause. The only solution to this apparent conflict is to assume an identity chain between the argument positions in the matrix and the participle clause, with overt realization in the latter position – in other words, backward control. In this section we will see how this can be accounted for within Lexical-Functional Grammar.

Let us first reflect on what the data in section 4 tells us about the nature of Greek and Latin word order. We will proceed on the traditional assumption that there are three broad families of syntactic operations that can lead to discontinuities: unbounded dependencies, scrambling and extraposition. This seems to be borne out by the data, since there are three

<sup>41</sup> Notice that the number of backward control cases are higher here than when we count the number of participle clauses with intruders. This is because of examples like (54) where the subject is on the edge of the participle clause but the structure must still be backward because of the coordination).

different sets of constraints on these operations: Unbounded dependencies target a well-defined syntactic position on the left edge of clauses and are cross-clausal. Extrapositions are less well-understood in Greek and Latin, but it is clear that they target the right edge of clauses and they seem able to cross nonfinite clauses at least. Scrambling leaves displaced material in positions that are harder to define syntactically, but are always internal to the clause where the displaced material belongs functionally. Here we only focus on scrambling.

Our data vindicates Ross's intuition that the traditional but loosely defined concept of 'hyperbaton' is scrambling (free word order) *within the clause*. But what is the nature of hyperbaton? Ross suggested that it be dealt with in a stylistic component of the grammar, using a rule that is very different from other syntactic rules. An analysis based on a more elaborate syntactic structure is found in Devine and Stephens (2000, 2006). They assume that all lexical categories project specifiers that can host displaced material and that hyperbaton is driven by information-structural concerns. Another, recent proposal (Agbayani and Golston 2010; Agbayani et al. 2011) treats hyperbaton as a purely prosodic phenomenon, arguing that it ignores syntactic constraints such as the left-branch condition (Ross 1967/1986), freezing islands (Wexler and Culicover 1980) and the adjunct condition (Huang 1982). It is unclear, however, whether these constraints are active in Greek and Latin, cf. the looser constraints on topicalization in these languages that were discussed in section 3.2.2.

For our purposes it is not necessary to take a definitive stance on the nature of hyperbaton, but there is one particular claim in Agbayani and Golston (2010) that we do need to deal with, namely that hyperbaton disregards syntactic constituency to the extent that it is "not clause-bounded in the syntactic sense" (Agbayani and Golston 2010, p. 146). This goes against the claim in Devine and Stephens (2000, p. 84) that hyperbaton essentially *is* clause-bounded, and as we have seen our data support Devine and Stephens against Agbayani and Golston. A prosodic view of hyperbaton is not thereby falsified, however, since the syntactic clause is in most cases also a prosodic unit.

That hyperbaton can often have a prosodic motivation seems probable. In many cases a prosodic motivation would not be distinguishable from an information-structural motivation, since prosody and information structure are closely connected. Still, since the discourse effect of hyperbaton is often slight or unnoticeable, the motivation could sometimes be purely prosodic. Hyperbaton is certainly used by stylistically aware authors to achieve desired prosodic patterns (so-called *clausulae*). On the other hand, there are obvious difficulties with constraining a prosody-based theory for a dead language.

The architecture of LFG lets us abstract away from the motivations for hyperbaton and focus exclusively on its syntactic aspects as encoded in the c- and f-structure. The c-structure should encode all and only the possible surface word orders while allowing the f-structure to capture the grammatical functions. We achieve this using the dual structure approach advocated in Austin and Bresnan (1996), who develop an account of free word order in Australian aboriginal languages. If, as seems likely, there are prosodic and/or information structural constraints on the word order, these will be encoded at other levels of the grammar.

In essence, then, we are treating hyperbaton/scrambling as a syntactic, clause-bound operation (which may have extra-syntactic motivations). It should be noted that this is broadly in agreement with the large literature on scrambling and configurationality within Minimalism (although it has been observed that Japanese may have long distance scrambling, cf. footnote 27.) We cannot do full justice to this literature here, but see e.g. (Hinterhölzl 2006, chapter 2) for a recent contribution and Corver and van Riemsdijk (1994) for the historic debate. Also relevant is Legate (2002) who in direct response to Austin and Bresnan (1996) argues that free word order in Warlpiri should be handled in a configurational syntax.

It is beyond the scope of this paper to offer a full justification of our analysis of Greek and Latin as nonconfigurational languages. In retrospect, it seems clear that it is hard to discuss (or even give a meaning to) the ‘configurationality parameter’ across syntactic frameworks. For researchers in derivational frameworks, it may seem that we give up configurationality because of ‘surface’ phenomena such as prosodically driven displacement. However, in LFG, configurationality (and word order in general) *is* a surface phenomenon concerning the constituent-structure, although it also has important consequences for the way language conveys grammatical information: when word order is sufficiently manipulated for information structural and/or prosodic purposes, it can no longer reliably signal grammatical functions to the interpreter, who has to rely on morphological cues such as case instead.<sup>42</sup> Non-configurationality is not crucial to our analysis of control but is adopted here for concreteness as the most straightforward analysis of Greek and Latin-type word order in LFG.

Central to non-configurationality in LFG is the exocentric category S, usually realized as a flat structure with no hierarchy among its constituents. But LFG does not view configurationality as a binary parameter, so there can be more than S to the sentence structure in non-configurational languages. In particular, the data in section 3.2.2 supports a functional projection CP dominating S, and this is the structure we will assume for Greek and Latin. Material in the specifier of CP, or adjoined to CP, will be assigned a topic or focus function by virtue of LFG’s general principles of structure-function mapping. This mapping also requires that material inside S will have *some* grammatical function in the clause.

Inside S, word order is free. This may seem permissive, but that is because the data requires it. For example, all orders of major constituents (SVO, SOV, OSV, OVS, VSO, VOS) are found with more than 5% frequency in our corpus.<sup>43</sup> To the extent that our approach overgenerates, we believe this is due to prosodic and/or information structural concerns that are not directly relevant to the syntax but should be dealt with in another component of the grammar.<sup>44</sup> Our approach assumes that there is no hierarchy among arguments nor any base word order. This is a natural assumption in the LFG architecture (though not a necessary one, nor one that is crucial to our analysis of control). What the base word order does in derivational grammar is instead achieved at f-structure.

The structure-function mapping in LFG allows for several maximal projections to correspond to a single f-structure. This means an NP can be split up at c-structure and assembled at f-structure, with one part contributing a head and another part contributing an adjunct. Let us now illustrate our approach to Greek and Latin word order by looking closer at an example with a discontinuous NP. In (89), the NP *teras mega* ‘a great wonder’ is split by its governing verb.

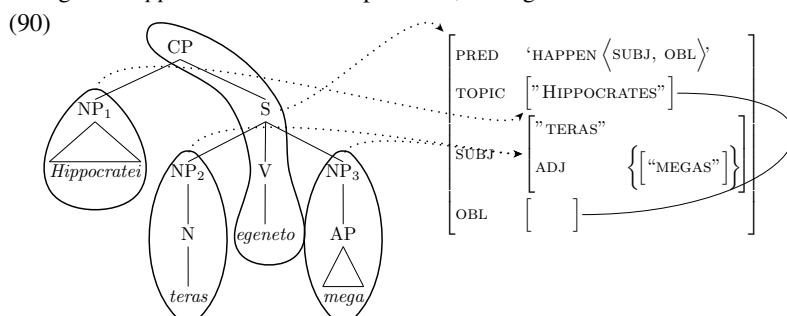
- (89) Hippokratei ... teras egeneto mega  
 Hippocrates.DAT wonder.NOM happen.PRF.3.SG great.NOM  
 ‘a great wonder happened to Hippocrates’

<sup>42</sup> The issue is of course different in derivational syntax, where one can assume a basic word order conforming to universal principles of structure-function mapping, from which the surface word order is derived. There is no room for cross-framework comparison of approaches to (non-)configurationality here.

<sup>43</sup> It is well-known that Latin (especially Caesar) has a much higher preference for head-final clauses than Greek. This could indicate that Latin has a variant rule where the head is obligatorily final, and all postverbal constituents are in fact extraposed. Without more knowledge of constraints on extraposition, it is hard to distinguish the two hypotheses empirically. In any case there is only a single example in our Latin corpus (82-c) where extraction may have applied to a participle clause, so we can ignore the issue here.

<sup>44</sup> In the parallel architecture of LFG, prosody does not work on the output of syntax: the two components simultaneously constrain the set of well-formed sentences.

Assuming that *Hippocratei* has been topicalized,<sup>45</sup> we get the c- and f-structures in (90).



The dotted arrows illustrate how information flows from the c-structure to the f-structure. The blobs in the c-structure identify nodes that contribute to the same f-structure: this sharing of f-structure is the standard way of modelling the head relation in LFG and applies in our example to V, S and the embedding CP. The information from all these nodes flows to the outer f-structure.

NP<sub>1</sub> is by assumption in spec,CP. This position assigns an operator function (for concreteness, (90) shows TOPIC but nothing hinges on this). By the extended coherence condition Bresnan and Mchombo (1987) the function must be functionally identified<sup>46</sup> with a bound function (a selected argument or an adjunct). Functional identification, as shown with the line in (90) means that the same syntactic element is present in two syntactic positions, giving rise to structure sharing. Island constraints apart (if they are at all relevant in Greek and Latin), the operator can in principle unify with any bound function: the choice in each case follows from independent principles. In (90), the governing verb selects for an OBL argument which is not present in the core clause S, so the structure would be incomplete unless the topic identifies with this function. Observe that this unification of TOPIC and OBL happens purely in the f-structure. There is only a single c-structure element and no trace in the core clause.

Scrambling, by contrast, works in a different way: it involves two NPs, NP<sub>2</sub> and NP<sub>3</sub>, at c-structure, which are unified in the mapping from c- to f-structure. So this is a different process from topicalization and we correctly predict that constraints on scrambling and unbounded dependencies are independent. The two NPs contribute a head and an adjunct respectively. The unification follows from case agreement combined with general principles such as functional uniqueness, requiring that each argument function is realized only once.

The crucial part in licensing the discontinuous NP in (89), then, is the fact that NPs are allowed to be exocentric, i.e. have no internal head. *mega* is such an exocentric NP. The phrase itself contains no head (the NP does not expand to an N), but at the level of functional structure there is a head, because NP<sub>2</sub> and NP<sub>3</sub> unify.

But suppose now that we required all NPs to be endocentric, i.e. to contain a (lexical) head. This would immediately block the structure in (90), as NP<sub>3</sub> does not have a head. And notice that we could not solve this by simply adding a head to NP<sub>3</sub>, for in that case, NP<sub>2</sub> and NP<sub>3</sub> cannot unify, as the two heads would conflict. So on that analysis there could be no strictly syntactic discontinuity (although there could be anaphoric ones if we assume that NP<sub>3</sub> contains a distinct but coreferring pronominal head).

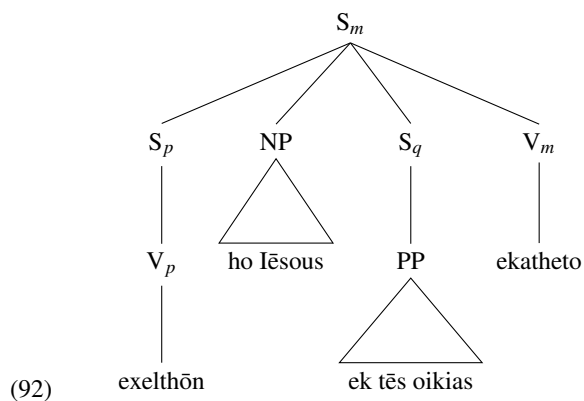
<sup>45</sup> I make this assumption purely for expository convenience, as it allows me to introduce structure sharing which is used both for topicalization and control in LFG.

<sup>46</sup> Operators can also satisfy extended coherence via anaphoric binding, but we ignore such structures here.



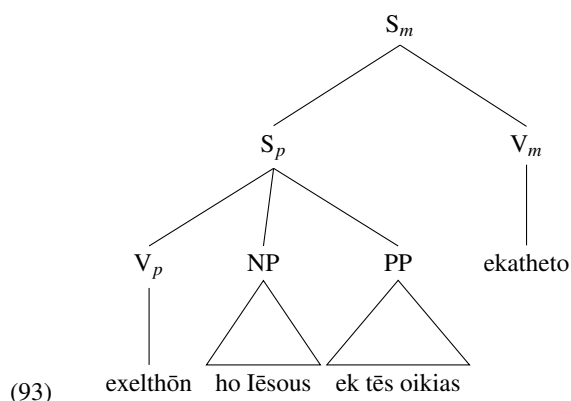
This gives us a way to parametrize non-configurationality that generalizes to all categories. If a language has a flat S-structure, but all phrases must have heads, we get free *constituent* order. If it also has exocentric lexical projections, we get free *word* order and discontinuous constituency. This parametrization carries over to S itself. S is always an exocentric category in the sense of not having a same-category head, but if we also allow structures where S does not even dominate a different-category head, we can get a discontinuous clause. Consider the analysis of (53) repeated here for convenience as (91). A simplified tree with a discontinuous clause is shown in (92).

- (91) en tēi hēmerāi ekeinēi *exelthōn* **ho** **Iēsous** *ek tēs*  
 in the.DAT day.DAT that.DAT step out.AP.NOM the.NOM Jesus.NOM from the.GEN  
*oikias* *ekathēto* *para tēn* *thalassan*  
 house.GEN sit.IPFV.3.SG by the.ACC sea.ACC  
 ‘Going out from the house that day, Jesus sat by the sea.’ (Matt. 13.10)



In this structure,  $V_p$  and  $V_m$  are exocentric heads of  $S_p$  and  $S_m$  respectively, in the sense of contributing the predicates of these clauses.  $S_q$  does not have a head and is therefore incomplete as it stands. However, as in (90), we can get a well-formed structure if we unify  $S_p$  and  $S_q$  at f-structure, thus ensuring that the PP ends up as an argument of  $V_p$ .

We do not pursue how this unification can be achieved, for what we have seen in section 4 is that the word order freedom of Greek and Latin does not in fact extend to the point of allowing split Ss as in (92). In other words, the structure is not as in (92) but involves a continuous participle clause  $S_p$ . If we assume that the participle clause is adjoined to the matrix, as motivated in Bary and Haug (2011), we get the structure in (93).



We can enforce this if S is parametrized to obligatorily contain a head; we will see below how this can be achieved.

## 5.2 A backward control analysis

Let us now look at how we can analyze the Greek and Latin type of backward control in this framework. In fact, we will see that it follows automatically from the LFG architecture (in particular, extensional identity) given CBD plus a few facts that have already been motivated:

1. Finite verbs assign case to their subjects
2. Participles do not assign case to their subjects but agree with them in case
3. Participles can head S

1–2 were motivated in section 3, and 3 is essentially what the corpus study in section 4 showed. Let us now see how these mechanisms are captured in the LFG formalism.

Disregarding some possible instances of quirky subjects, finite verbs always assign nominative case in both Ancient Greek and Latin.<sup>47</sup> In LFG terms this means that we formalize 1 with the equation in (94) on all finite verbs.

$$(94) \quad (\uparrow \text{SUBJ CASE}) = \text{NOM}$$

(94) says that the verb ‘sets’ the subject’s CASE feature to NOM. So even though (94) originates from the verb, it determines a syntactic feature in the subject. Syntactic locality is maintained because the path in (94) consists of a single grammatical function SUBJ. Equations like  $(\uparrow \text{SUBJ SUBJ CASE}) = \text{NOM}$  are disallowed by universal grammar.

Finite verbs also agree in number and person with their subject and it is instructive to see how this is captured in LFG. (95) gives equations for a third person singular verb.

$$(95) \quad \begin{aligned} (\uparrow \text{SUBJ PERSON}) &= 3 \\ (\uparrow \text{SUBJ NUMBER}) &= \text{SG} \end{aligned}$$

(95) looks exactly like (94) in the sense that the verb sets features of its subject, so agreement and case assignment are captured with the same syntactic mechanism (a defining

<sup>47</sup> Some infinitive structures also assign case to the subject, but that is irrelevant here.

equation). In this respect, LFG is similar to certain varieties of Minimalism, where it is also assumed that the Agree mechanism is responsible for both nominative case assignment and person/number agreement, see e.g. Adger (2003, p. 211–217). In this way, the features CASE, GENDER and NUMBER are only syntactically active in the locus of the NP, although they are represented as agreement/assignment equations on the verb (or as uninterpretable features in Minimalism).<sup>48</sup> That makes agreement and assignment similar in many ways, but there is an underlying difference as to what goes on in the morphology. The central point is that (94) is invariant under all inflections of the finite form: all finite forms assign nominative. By contrast, (95) will vary with the inflectional form: there are finite forms that are categorically and semantically identical to the third person singular, but show different features.

We now turn to the formalization of 2, participle-subject agreement. Recall that Ancient Greek and Latin participles bear overt case marking, which must agree with their subject's case. For a nominative participle, this means that the equation is as in (96).

$$(96) \quad (\uparrow \text{SUBJ CASE}) = \text{NOM}$$

(96) looks exactly like (94), but the similarity hides the crucial difference that (94) from the finite verb is invariant under inflection whereas (96) comes in variants with ACC, GEN etc. depending on the overt case marking on the participle. Crucially, these variants differ *only* in the case value, so it is a pure agreement fact. For example, the participle *exelthōn* 'going out' bears morphological nominative case which gives us the equation in (96), but it also has a variant *exelthonti* which is in the dative, giving us a different agreement equation whereas everything else stays the same. (97) gives sample lexical entries.

(97)	<i>exelthōn</i>	V	PRED) = 'STEP OUT ⟨SUBJ, OBL <sub>source</sub> ⟩'
			(VFORM) = PTCP
			(SUBJ CASE) = NOM
			(SUBJ GENDER) = MASC
			(SUBJ NUMBER) = SG
	<i>exelthonti</i>	V	PRED) = 'STEP OUT ⟨SUBJ, OBL <sub>source</sub> ⟩'
			(VFORM) = PTCP
			(SUBJ CASE) = DAT
			(SUBJ GENDER) = MASC
			(SUBJ NUMBER) = SG
	<i>exelthontes</i>	V	PRED) = 'STEP OUT ⟨SUBJ, OBL <sub>source</sub> ⟩'
			(VFORM) = PTCP
			(SUBJ CASE) = NOM
			(SUBJ GENDER) = MASC
			(SUBJ NUMBER) = PL

These forms are indistinct as far as argument structure, and syntactic category and other features go. (Case assignment to non-subjects would also remain the same, but is irrelevant here.) In Greek there are in principle 36 such forms (4 cases x 3 genders x 3 numbers) that share these properties, although many of them are not morphologically distinct. What sets participles apart from finite verbs is that in participles SUBJ CASE takes part in the agreement alternation along with SUBJ GENDER and SUBJ NUMBER, whereas with finite

<sup>48</sup> There is an alternative view of agreement which considers the features to be syntactically active in both loci. This has been argued for at least some instances of participle-verb agreement in Latin by Haug and Nikitina (2015). Here we follow the standard view, which is in any case correct for Greek.

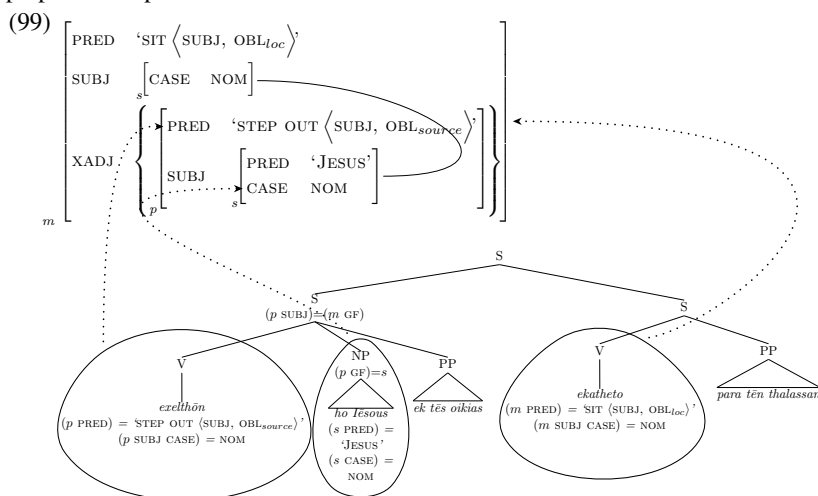
verbs, agreement concerns SUBJ PERSON and SUBJ NUMBER while SUBJ CASE remains fixed. Observe that, although the participle bears morphological case, it does not have a syntactic CASE feature, but rather specifies the case of its subject (SUBJ CASE). Hence, there will be no CASE feature in the participle's own f-structure. This is the LFG equivalent of saying that the participle's morphological case is uninterpretable in Minimalist terms.

Finally, we come to the formalization of 3, that participles can head S. For simplicity, we will just assume here that participles are of category V and that the head of S must be a V, as in (98).

$$(98) \quad S \rightarrow V, \quad XP^* \\ \uparrow = \downarrow \quad (\uparrow GF) = \downarrow$$

The comma in this rule indicates that the constituents are unordered, and the Kleene star on XP indicates that there may be any number of XPs (possibly zero). By contrast there can only be a single verbal head of category V and, as we saw in section 5.1, this head must be present to enforce CBD - if we allow S without a head, that S could unify with another S in the sentence to produce a discontinuous clause. If a V head is obligatorily present it is tempting to replace (98) with an ordinary endocentric structure, e.g. by recasting the clause as an IP and its head as I. This would lead us to the conclusion that participles can (under certain conditions) appear in I, which is in accordance with their finite-like semantics, as observed in Bary and Haug (2011). We will ignore that issue here, however, as it is orthogonal to the analysis of control.

With this in place we can pass to the analysis of (53)=(91). Abbreviated c- and f-structures are given in (99). All features except case are left out. To simplify the presentation, the prepositional phrases have been left out of the f-structure.



Let us walk through this analysis and see how each part of it is motivated and how the whole results in backward control with case sharing, without further stipulations.

The equations under the terminal nodes are (parts of) the lexical entries of these words. *m* refers to the f-structure of the matrix clause, *s* to that of the subject, and *p* to that of the participle. Any constraints coming from the lexical entry of the matrix verb, for example, must be stated 'starting from' *m* (and similarly for the subject and the participle) to ensure syntactic locality.

The finite verb *ekatheto* comes with the constraint  $(m \text{ SUBJ CASE}) = \text{NOM}$ . Sequences of features should be read as paths through the f-structure:  $(m \text{ SUBJ CASE})$  denotes the feature we get at by going from  $m$  (the matrix f-structure) through SUBJ to CASE.  $(m \text{ SUBJ CASE}) = \text{NOM}$  is therefore a standard case-assigning equation, assigning nominative to the subject of a finite verb. As the dotted arrow shows, this equation puts NOM in the matrix subject function.

Next, the subject *ho Iēsous* comes with the case feature  $(s \text{ CASE}) = \text{NOM}$ . This is ordinary morphological case, which ends up in the embedded subject position, as shown by the dotted arrow. Moreover, as discussed above, on our nonconfigurational assumptions the c-structure does not assign a specific grammatical function to the NP, but it does require it to bear *some* function inside its clause as per CBD. This is captured by the constraint  $(p \text{ GF} = s)$ :  $s$  should be the value of some grammatical function GF in its clause. The phrase structure therefore underspecifies the function of the NP. However, if we try to construe *ho Iēsous* as anything else than a subject we get an ill-formed structure: there is no other governed grammatical function available that *ho Iēsous* can take, assuming as we must that there are constraints (not shown) preventing it from filling the  $\text{OBL}_{\text{source}}$  function.

Third, the participle comes with an equation  $(p \text{ SUBJ CASE}) = \text{NOM}$ . This is motivated by the agreement facts discussed in 3.1. Superficially, it looks like the equation that comes with the finite verb, but it is of a different nature: NOM is not structural case nor lexically governed, but results from agreement: since *exelthōn* is nominative it must agree with a nominative subject. That is, although the CASE equations on the participle *exelthōn* and on the finite verb *ekatheto* are the same, they have different origins and functions. The nominative case assignment equation on *ekatheto* is determined by the finite form of the verb, and there is no alternative finite form of the verb that could be used and yield a different case assignment. By contrast, the nominative case agreement results from a morphological process where the right-hand side of the equation gets the value NOM because there is overt nominative case marking. There are alternative forms available that are identical to the one used in all respects except in having equations  $(p \text{ SUBJ CASE}) = \text{ACC}$ ,  $\text{DAT}$  or  $\text{GEN}$ , so we are capturing an agreement phenomenon, although at the level of abstraction embodied by the functional descriptions, the syntactic mechanism is the same as in case assignment. Conceptually this is similar to the way in which the single syntactic mechanism Agree in Minimalism can be used to capture both ordinary agreement and other syntactic processes such as case assignment.

In addition to the three lexical entries, there is a control equation on the adjoined S. We saw in (21) that in complement control, the control equation is determined by the matrix verb. In adjunct control this is not possible, since by definition there is no head selecting for the adjunct. The control equation is therefore part of the adjunction rule. It reads  $(p \text{ SUBJ}) = (m \text{ GF})$ , meaning that  $(p \text{ SUBJ})$ , the subject of the participle, must be identified with *some* grammatical function (GF) in the matrix clause,  $(m \text{ GF})$ .<sup>49</sup> Case agreement leaves only one option, namely to instantiate GF as SUBJ, leading to the identification  $(p \text{ SUBJ}) = (m \text{ SUBJ}) = s$ . This identification makes it possible for the matrix verb to assign case to its subject without violating syntactic locality, even if the subject appears in another clause.

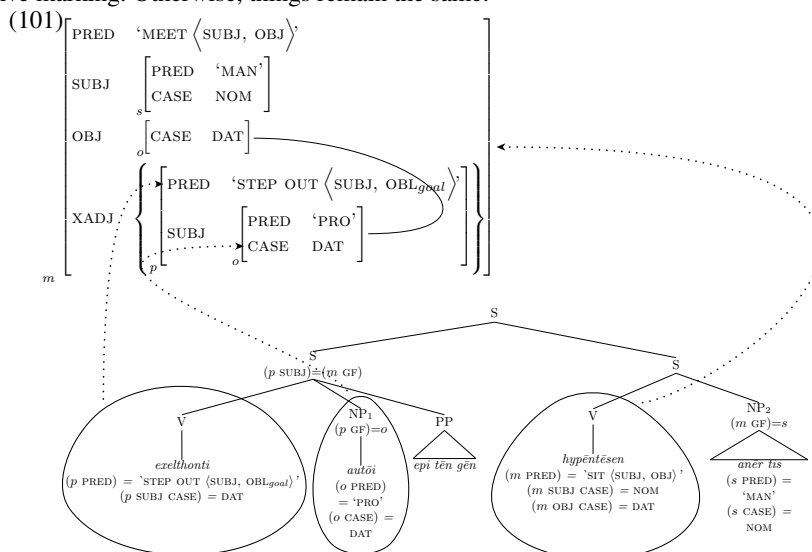
Since the control equation does not specify *which* grammatical function the shared argument should have in the matrix clause (although case agreement will in most cases leave only one possibility), the approach generalizes directly to non-subjects. We do not have to

<sup>49</sup> Notice that in LFG, control is handled in functional rather than structural terms and any constraints on control will be handled in terms of functional superiority (f-command) rather than c-command relations. See Bresnan (1982) for a justification of this approach.

assume e.g. different adjunction sites (which would not be supported by the word order facts) for conjunct participles whose subject is not the subject of the matrix clause. Consider now (100), where the participle's subject is a matrix object.

- (100) *ekselthonti de autōi epi tēn gēn hupēntēsen anēr*  
 go out.AP.DAT but him.DAT on the.ACC shore.ACC meet.PFV.3.SG man.NOM  
 tis  
 some.NOM  
 'As he stepped onto the shore, some man met him.' (Luke 8.27)

In this case, the participle's subject is a dative argument of the matrix verb. So, we need the form of the participle that requires a dative subject, i.e. the form from (97) that has overt dative marking. Otherwise, things remain the same.<sup>50</sup>

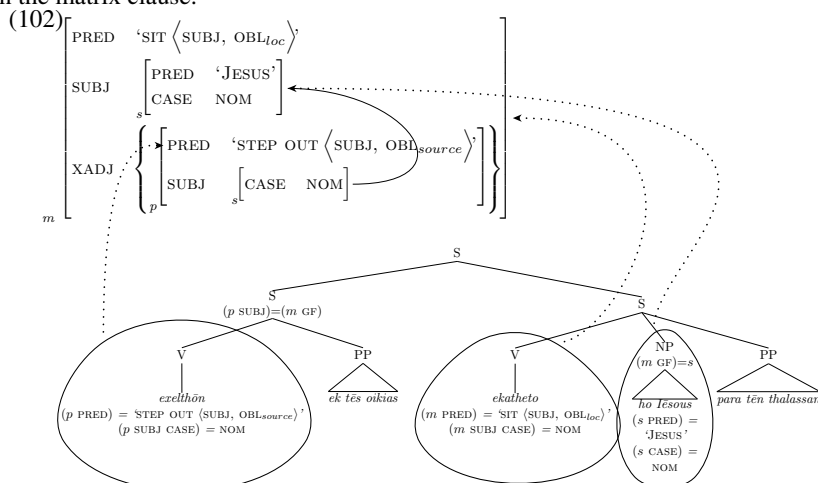


Grammatical function assignment follows analogously to (99) except we have one more NP. Both NPs are only assigned *some* grammatical function in their clause by the equations  $(m\ GF) = s$  and  $(p\ GF) = o$ . However, the extended coherence principle requires both to assume a governed grammatical function. Consider NP<sub>2</sub> in the matrix clause first. The matrix verb provides two governed functions, SUBJ and OBJ. If NP<sub>2</sub> is OBJ we get an inconsistent CASE FEATURE, because that means  $(m\ OBJ) = s$  and hence we get both  $(s\ CASE) = NOM$  and  $(s\ CASE) = DAT$ , which is impossible. So NP<sub>2</sub> must be SUBJ. Consider now NP<sub>1</sub>. It must get a governed function in its clause. Its verb has two, SUBJ and OBL<sub>goal</sub>. Again, we assume that there are constraints not shown that forces OBL<sub>goal</sub> to be filled by a PP, not an NP. So only SUBJ is available. But even if more functions were available, the case features would clash if *autōi* assumed a function that was assigned, say, accusative. So the effect of the agreement equation *within the participle clause* is in this regard entirely analogous to that of the case assignment equation in the matrix clause. The difference is that the participle can “adapt” to a different subject case by agreeing in a different case. This difference would be uninteresting if case assignment was purely internal to the participle clause: we would simply predict that any case was fine as long as it was the same on both the participle

<sup>50</sup> In this example, unlike in (99), the oblique argument realizes a goal rather than a source for independent reasons.

and its subject. The reason agreement turns out to be crucial is that case assignment is *not* purely internal to the participle clause. The control equation  $(p \text{ SUBJ}) = (m \text{ GF})$  means that NP<sub>1</sub> must assume a function in the matrix clause too and hence it must satisfy CASE constraints in that clause too, in this particular example it must be dative. Indirectly, the matrix verb assigns case to its argument (cf. CASE DAT on the matrix OBJ), the participle agrees with its subject (cf. CASE DAT in the embedded SUBJ), and the two positions are identified (as shown by the line) by an equation stated in local terms on the adjoined S.

Observe also that if we move the shared argument to the matrix clause, nothing happens in the f-structure. This is shown in (102), a minimal modification of (99) where the subject is in the matrix clause.



The feature PRED 'JESUS' now originates in the matrix clause and is shown as part of the matrix SUBJ, but this is merely an illustrative device since the two positions are identified. This means that our account correctly predicts that control in Greek and Latin conjunct participles can be either forward or backward. Where the participle surfaces is purely a matter of linearization (c-structure); the abstract syntactic relations do not at all change, because the control mechanism as implemented through extensional identity is fundamentally symmetric and does not care about directionality.

### 5.3 Deriving the distribution

Nevertheless, one may ask the question as to what governs the surface realization of the controller. This calls for more research, but I offer some preliminary thoughts here.

First, observe that Greek and Latin conjunct participles can be subdivided in three functionally distinct categories (Bary and Haug 2011; Haug 2012; Goldstein 2016). They can be event modifiers (*elaborations* in the terminology of Haug (2012)), sentence modifiers (*frames* in Haug (2012) or separate predications forming a chain (*independent rhemes* in Haug (2012))).

Elaborative participles typically express the manner, means or accompanying circumstances of the matrix event, cf. (103).

- (103) *ekhōn*      *d'* *an*      *tautēn* *ēgoraze*      ...  
 wear.PP.NOM but PARTICLE this.ACC hang.out.in.agora.IPFV.3.SG  
 'Wearing this (Scyles) used to hang out in the agora...' (Hdt. 4.78.4)

Here, the participle gives more information about the matrix event. By contrast, in (104), the participle refers to an event that is distinct from the matrix event, but serves as a frame and thus locates the matrix event temporally.

- (104) *tēn* *stolēn*      *apothemenos*      *tēn* *Skuthikēn*  
 the.ACC equipment.ACC take.off.AP.NOM the.ACC Scythian.ACC  
*labeske*      *an*      *Hellēnida* *esthēta*  
 put.on.IPFV.3.SG PARTICLE Greek.ACC clothing.ACC  
 'After (Scyles) took off his Scythian equipment, (he) would put on Greek clothing.'  
 (Hdt. 4.78.4)

Bary and Haug (2011) argue that elaborations (103) and frames (104) attach to different positions (elaborations are somewhere inside the matrix S, while frames are in a topic position), but treat both participle types as projecting a VP. But in order to host a subject, as we have seen, the participle must have a clausal projection (S). Haug (2011) observed that elaborative participles never host subjects, i.e. they cannot license backward control. A natural interpretation of that fact is that the projections differ in size: elaborative participles project VPs and framing participles project S.

That view has in fact been argued independently by Goldstein (2016, p. 223) based on clitic distribution. Consider (103)–(104). Both these examples have an imperfective matrix verb and a modal particle *an*, giving an iterative reading. *an* is a Wackernagel clitic that goes in the second position of its clause. In (103), the participle's projection is subclausal and hence counts for clitic placement. In (104), by contrast, the participle projects a separate clause and the modal particle goes in the second position of the matrix clause.

Interestingly, temporal semantics points in the same direction as the control facts and the clitic distribution. Elaboration participles only indicate aspect (Bary and Haug 2011, p. 10): in (103), the matrix verb *ēgoraze* determine the past reference and the imperfective aspect on the participle *ekhōn* gives us simultaneity with the matrix verb. In (104), by contrast, the participle clause serves to determine the temporal reference of the matrix verb. This is consistent with the participle's projection being an untensed VP in (103) and a tensed S in (104).

This explains part of the distribution of forward and backward control. Neither (103) nor (104) has an overt controller (because of prodrop), but if there was one, we predict that in (103), it would have to surface in the matrix clause because the participle's projection is too small to host a subject. This is the same explanation as in English: raising and control complements (and adjuncts) are VPs and hence cannot host a subject.

But given that the participle projection in (104) *can* host a subject, would an overt controller end up there or in the matrix clause? Before we discuss that question, consider the third type of participles, independent rhemes (Haug 2012) (also known as participle chaining, Goldstein 2016). (105) shows an example.

- (105) *dramōn*      *de tis*      *kai gemisas*      *spoggon*      *oxous*  
 running.AP.NOM but some.NOM and filling.AP.NOM sponge.ACC vinegar.GEN  
*peritheis*      *kalamōi* *epotizen*      *auton*  
 putting.AP.NOM reed.DAT give-to-drink.IPFV.3.SG him.ACC



Someone **ran** and **filled** a sponge with sour wine, **put** it on a reed, and gave him a drink ... (Mk. 15:36)

In (105) we have four distinct events that are obviously sequential: the running precedes the filling, which precedes the putting on a reed, which precedes the giving to drink. The semantics resembles that of coordination. There is temporal dependence (namely sequencing or ‘narrative progression’), but as argued by Bary and Haug (2011) it works from left to right: the leftmost participle clause gets its temporal reference from the discourse context, and the following events are understood as following on each other. So the temporal semantics point in the direction of a tensed clausal projection (S) in such cases. And as (105) shows, participle chaining does license backward control – the overt subject *tis* ends up in the first participle projection.

In fact, Haug (2011, p. 289) argue that this is the general principle for linearizing the control relation in Ancient Greek and Latin participial adjuncts: if overtly realized, the shared argument is always found in the leftmost legitimate host, i.e. a participial S projection if there is one to the left of the matrix clause; otherwise in the matrix clause.

Further research is required to verify this hypothesis. It is not always clear whether a participle is an elaboration and hence cannot host a subject because its projection is too small. This requires careful investigation of the texts. But if the generalization is correct, it is interesting because it ties in with the traditional idea (see e.g. Hornstein 1990) that controlled clauses are temporally dependent on their controlling clause. As we saw above, temporal dependencies in participial frames and chains goes from the left to the right whereas in elaborations it works from the matrix clause to the dependent. Hence, if the control relation mirrors temporal dependencies, we would expect it to go from the matrix to the dependent in elaborations (thus giving forward control), but from the left to the right in frames and independent rhemes, thereby potentially giving rise to backward control. In a sense, then, these types of conjunct participles display two properties that are jointly characteristic of finite verbs: the ability to host an overt subject and to have independent temporal reference. Conjunct participles are still in a syntactic sense subordinate to their matrix verb, because they cannot form a full sentence alone. The construction is interesting from the perspective of clause-linking and the information structural organization of the clause, but we must leave the matter unexplored here.

## 6 Conclusions

### 6.1 Control in Greek and Latin participial adjuncts

As far as pure syntax goes, control can be realized either forward or backward and this is what our analysis predicts. To sum up, the crucial ingredients to the analysis are CBD (whether enforced non-configurational as here, or in an alternative way); the ability of (some) conjunct participles to head a projection that can host a subject; and the fact that the relationship between the participle and its subject is coded by case agreement rather than case assignment, which would lead to inconsistent case features on the shared argument. (Though note that, if there was case assignment in the participle clause but the participle happened to assign the same case as the matrix verb, we could get backward control in an arguably ‘accidental’ way on standard LFG assumptions. This may have implications for LFG’s case theory that we cannot pursue further here.) Given these three phenomena, the possibility of backward control follows automatically in the LFG framework because of the

extensional notion of identity. However, we also see why the Greek and Latin situation is rare: it is unexpected for a verbal form that cannot assign case to a subject to be able to head a projection that can host a subject. This begs the question of *why* Greek and Latin participles can host subjects. We saw above that there is a connection with their temporal properties, in line with traditional ideas in control theory (and also found in a different guise in the work of Landau). But the larger question, which must be left aside here, is why there should be a connection between control and temporal reference.

## 6.2 The nature of syntactic identity

Given these three crucial properties of Greek and Latin participles, LFG predicts the possibility of backward control. The identity chain that is established between the matrix position and the embedded subject makes sure that the case that is assigned in the matrix clause will also be present in the lower clause.

Notice that Greek and Latin participial adjuncts actually have a number of other properties that have been taken as diagnostics of identity. For example, we find split control both in English complements (obligatory control) and gerundial adjuncts (non-obligatory control), cf. (106)–(107).

(106) Kim<sub>i</sub> persuaded Sandy<sub>j</sub> to PRO<sub>i+j</sub> do the dishes together.

(107) Mary<sub>i</sub> lost track of John<sub>j</sub>, because, PRO<sub>i+j</sub> having been angry at each other<sub>i+j</sub>, he had gone one way and she another. (Bresnan 1982, p. 397)

This kind of control is not found with Greek and Latin participial adjuncts,<sup>51</sup> and that follows directly from an identity analysis. Notice also that since Greek and Latin participles agree in case with their subject, it is unclear what case the participle should assume in analogues of (106)–(107). Control by implicit arguments (e.g. unexpressed agents in passives) is also not possible in Greek or Latin (Haug et al. 2012, p. 143–145), which again follows directly if we assume that the agent in a passive is not present in the syntax (unless overtly expressed by an adjunct).

However, while these properties follow directly from any identity analysis, the case transmission in backward control relies crucially on a particular notion of identity which is independently motivated in LFG because of the framework's mathematical, set-theoretical underpinnings, namely *extensional identity*. Syntactic objects are just collections of features (ordered pairs of attributes and values) and two syntactic objects are the same iff they have exactly the same features. An identity chain therefore always implies identity of all syntactic features, including case.

This extensional notion of identity is very natural in a non-derivational framework, because there is no “temporal” dimension to the analysis. In a derivational framework, on the other hand, it may be natural to assume that the “same” syntactic object has different properties (features) at different points in the derivation, which obviously requires a different, non-extensional notion of identity. And in fact, there is considerable disagreement on what is the proper notion of identity in derivational frameworks. On the one hand, analyses involving multiply case-marked identity chains typically assume that sequential case assignment overwrites previous values (Haddad and Potsdam 2013) so that the case feature cannot individuate syntactic objects. On the other hand, there are also derivational approaches based

<sup>51</sup> This is of course a negative claim about Greek and Latin and potentially problematic, but I take it to be relatively uncontroversial.

on multidominance (see e.g. de Vries 2009) which come very close to structure sharing in the non-derivational sense, because a single syntactic node is assumed to have two mothers. However, it is unclear whether full extensional identity is available even in such approaches. As pointed out by Kobele (2006, p. 139), “we need to make sure that the syntactic features that drive the derivation don’t get duplicated”. In the context of Greek and Latin conjunct participles, this means that case checking cannot be instrumental in establishing the identity chain. In any case, the Greek and Latin data clearly support a version of extensional identity as assumed in non-derivational frameworks, and we leave it as a challenge to multidominance-based theories to see whether an adequate notion can also be developed in such frameworks.

### 6.3 Outlook: backward control with case independence

It is beyond the scope of this paper to study the implications for the analysis of backward control in languages like Tsez, Malagasy and Assamese, where there *is* multiple case assignment, as discussed in section 1.1. But we end by sketching two possible reactions. Taken together, the data shows that backward control can occur both with multiple case assignment and with case transmission. This means that backward control and case transmission cannot both diagnose identity control as opposed to coindexation. One of the two connections must be given up: Either the backward/forward distinction or the case transmission/multiple assignment distinction must be orthogonal to identity/coindexation.

If we go the first way, the case facts follow automatically. Backward control with multiple case assignment is coindexation and backward control with case transmission is identity. Moreover, we can uphold the generalization in (29) under the assumption – widely held in work on partial control – that the possibility of partial control diagnoses coindexation. We also get a new testing ground for that generalization, since we now expect case transmission in backward control to diagnose exhaustive control. This is clearly correct for the Ancient Greek and Latin data, as noted above. Furthermore, Malagasy and Korean, which would have backward coindexation control on this analysis, shows backward control with verbs such as *persuade* (Polinsky and Potsdam 2006, p. 176 ex (8)), which typically takes partial control, again bearing out the predictions in (29). Backward object control with the typical coindexation verb ‘allow’ is also found in Hinuq, which is closely related to Tsez (Forker 2011, p. 556 ex (1095c)). But the Tsez data would remain surprising because they involve phase verbs, which typically involve exhaustive control, but still show multiple case agreement.

In sum, this theory would clearly directly predict the correct case facts and moreover, and yield some interesting predictions about partial and exhaustive control. However, it cannot be denied that there are also serious problems. In particular, there is a widespread assumption that coindexation through binding requires superiority on some hierarchy (either c-command or, in LFG, functional superiority). One way to get around this problem would be to assume a semantic control mechanism, as Cormack and Smith (2002) argue is necessary for independent reasons in Tsez. On their analysis, the matrix position is a null argument that is existentially closed: the control relationship follows from the lexical semantics of the control verbs. This, they claim, is the reason why a distributive quantifier in the controllee position is illicit in Tsez. At least in Latin, however, distributive quantifiers are licit controllees as we saw in (52). If we follow Cormack and Smith (2002), then, case transmission should go hand in hand with the availability of quantified controllers, while case indepen-

dence should exclude such controllers. It remains to be seen whether this generalization can be upheld.

A second way to go would be to conclude instead that case is orthogonal to identity/coindexation. There are two ways to do this. We can downplay the importance of case in the syntax. This is essentially what Polinsky and Potsdam did in early work (Polinsky and Potsdam 2002a), where they assumed that the unpronounced matrix position does not actually receive case. In an LFG setting, Sells (2006) has argued for a reduced role for case in backward control by claiming that although case helps establish grammatical relations it is not itself a syntactic feature. Alternatively, we could assume multiply case-marked chains despite the Landau's objections (reviewed in section 2.4). Both of those approaches have clear advantages for control theory. We can uphold the traditional claim that coindexation requires hierarchical superiority, while in identity chains, either element can be overt.

But here too there are downsides. If backward control always involves identity, it is unclear what is responsible for the distinction between languages with case transmission in backward control and languages with multiple case assignment. If the difference has to do with the status of the case feature, we would like to see independent evidence that case has a different status in the relevant languages. If it has to do with multiple case assignment, things are perhaps clearer, as it may be that multiply case-marked chains are allowed everywhere but simply do not arise in Greek and Latin because the participle does not case mark its subject. On the other hand, the multiple case assignment approach may run into problems if the generalization in (29), linking to exhaustive, identity-based control to the lack of case assignment in the lower position, is correct.

Which way to go is ultimately an empirical question that hinges on closer analysis of the facts in the languages that have multiple case assignment in backward structures as well as empirical studies on the correlation between case independence and the licensing of quantificational backward controllers, and between case assignment and exhaustive/partial control. As such, it does not bear directly on the Greek and Latin data discussed in this paper, and we will leave the question open here. What I hope to have shown, however, is that the Greek and Latin data are sufficiently clear to play an important role in future research into the nature of backward control. They clearly attest to a type of backward control that bears out the exact predictions of extensional identity. Moreover the Greek and Latin construction studied here is considerably more general than other instances of backward control: it is common, easy to find in corpora and come with no lexical restrictions. It is, I believe, the clearest case of backward control that has so far been documented and demonstrate the existence of a typological rarum in two well-known languages, showing that there is still work to do even in Greek and Latin, which for a long time formed the conception in Western linguistics of what is "normal" for a language.

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