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A HIERARCHICAL TP STRUCTURE IN ANCIENT GREEK

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Abstract A vast body of research has proposed that Ancient Greek exhibits a fairly free word order, unconstrained by purely syntactic principles, and only determined by stylistic and expressive factors. Successive investigations have explored the possibility that at least a portion of the Ancient Greek clause structure conforms to already attested linguistic tendencies, according to various theoretical frameworks. This paper contributes to the debate by investigating a rather understudied clausal domain, namely the mood-tense-aspect portion of the clause structure (the so-called tense phrase, TP), with the help of a novel diagnostic, i.e. adverb placement. We argue that a hierarchical structure can be envisaged for the Classical Greek TP. We examine the position of the finite verb and the distribution of subject and object DPs in relation to the order of a series of temporal-aspectual adverbs. By adopting Cinque's (1999) adverb hierarchy, we show that the relative order of adverbs obeys the hierarchical structure proposed there for functional categories. If a fixed position for adverbs is assumed, as in Pollock (1989) and Cinque (1999), they can be used as markers to determine the position of other constituents in the clause, such as verbs and DPs. We then demonstrate that verb placement as well as the subject/object DP position with respect to various adverbs can be well accounted for within the cartographic model.

1 Introduction

A long-lasting debate on Ancient Greek syntax concerns the identification of rules governing the great variety of word orders between nominal and verbal constituents. It is traditionally assumed that Ancient Greek exhibits a fairly free word order, only influenced by stylistic, expressive and pragmatic factors (see Meillet 2003: 68–69 i.a.). Various studies have dealt with the high clausal domain by investigating the so-called Wackernagel particles

(see e.g. Agbayani & Golston 2010; Goldstein & Haug 2016; Goldstein 2016a; 2016b; Allan 2017), as well as the relative position of subject, object and verb (see Frischer et al. 1999; Fraser 2002), and concluded that word order in Ancient Greek is not constrained by purely grammatical or syntactic principles. Moreover, this idea was recently further explored to the extent that Ancient Greek has been classified among non-configurational languages (Hewson & Bubenik 2006; Luraghi 2010; Ponti & Luraghi 2018).

A different conclusion has been reached by studies working within generative approaches. Building on theoretical syntactic models which implement the role of discourse into syntax (e.g. Rizzi 1997 and later works), researchers have shown that, within a more elaborate syntactic model, the left periphery of Ancient Greek clauses can receive proper treatment, and some grammatical constraints on Ancient Greek word order can indeed be detected. While this conclusion holds for the higher layer of the clause, the CP, very few formal studies have ever tried to determine whether word order below the CP is also governed by grammatical constraints (but see Taylor 1994; Windhearn 2021). This issue is of particular relevance in light of proposals according to which Ancient Greek clausal structure is flat below the CP, while hierarchically ordered in the CP domain (see Goldstein 2016a). Accordingly, it is still an open question what formal description suits the clausal structure below the CP.

This paper addresses the issue by investigating the structural organisation of the mood-temporal-aspectual portion (TP) with the help of a novel diagnostic, i.e. adverb placement. Very much in the spirit of Pollock (1989) and Cinque (1999), we exploit adverbs as markers to determine the position of other constituents. We argue that the temporal portion of the clause in Ancient Greek is hierarchically ordered and can be effectively modelled within the cartographic framework. We provide three arguments in support of this claim. We first demonstrate that the relative order between different adverbs conforms to Cinque's (1999) hierarchy. Next, we consider the relative order between adverbs and verbs (second argument) and, finally, between adverbs and argumental DPs (third argument). While the same adverb can both precede and follow the finite predicate, a quantitative analysis demonstrates that the relative order between finite predicates and adverbs is dependent on the height at which each adverb is merged. Likewise, while the same adverb can both precede and follow subject and object DPs, a quantitative analysis reveals that the probability for an adverb to follow an argumental DP depends on whether it is the subject or the object.

Our testing ground is restricted to Classical Greek. Given the great variability in genres and styles reported in the literature, our investigation is main-

ly based on the eight books of the *History of the Peloponnesian War* by Thucydides. In addition, because the number of relevant examples is too scarce to empirically verify the relative order between adverbs, four other Athenian classical prose writers are included: Isocrates, Lysias, Plato, and Xenophon. The adverbs used for the investigation are a selection of modal, temporal and aspectual adverbials; the complete list is reported in (7) in §4.1. We argue that the TP layer in Ancient Greek is structurally organised according to the hierarchy in (1), where each of the functional heads considered in this work is paired with a Greek adverb.

(1) [*ek toû eikótos* Mod(epistemic) [*nûn* T(present/past) [*ísōs* Mood(irrealis) [*aûthis* Asp(repetitive) [*pollákis* Asp(frequentative) / *katà tákhos* Asp(celerative) [*ḗdē* T(anterior)]]]]]]

Although further research is needed to determine whether our results can be extended to other authors and other textual genres, this paper demonstrates that a cartographic analysis is suitable for Ancient Greek word order in the TP layer, and thus that there are hierarchically organised projections even below CP.

The paper is structured as follows. In §2 we review the main positions held for the structure of the clause in Ancient Greek, thereby highlighting the relevance of the current study. In §3 we summarise the theoretical tool at the basis of our work. In §4 we explain the method: a description is provided of how we collected and selected the data considered for testing our claim. The core of the paper is in §5, where we discuss three arguments in support of our proposal. In §6 we draw some conclusions.

2 State of the art

Ancient Greek word order has often been claimed to be essentially free and not constrained on purely grammatical grounds. Much literature indeed argued that only stylistic factors or emotional relevance determine the placement of constituents in a given sentence, to such an extent that it is impossible to identify a grammatical rationale behind Ancient Greek word order (see Goodell 1890; Gildersleeve 1902 for early definitions of the problem; see Meillet 2003: 68–69; Denniston 1952: 8; Dover 1960; Dunn 1981, 1988 for the aforementioned conclusion).

Conversely, other works have argued that Ancient Greek word order could indeed be explained by adopting a model of clausal structure based on the pragmatic notions of Topic and Focus, as in the functional grammar frame-

work (Dik 1989). For instance, Dik (1995) proposed that the organisation of the elements in a clause is fundamentally linear, with pragmatically marked constituents on the left of the verb and unmarked ones on its right, as in (2) (see also Matić 2003 on Xenophon; Bertrand 2010 on Homer).

(2) Pragmatic clausal structure for Ancient Greek (Dik 1995: 12)

P1	PØ	V	X
Topic	Focus	Verb	Pragmatically unmarked material

The P1 and PØ positions can be filled with a great variety of constituents, including arguments, adjuncts and the predicate itself. Consequently, the relative order of the arguments can be easily explained in terms of their pragmatic function. For instance, both SO and OS orders before the verb are possible, but distinct interpretations are expected.

What these works convincingly demonstrated is that pragmatic factors, and more precisely the notions of Topic and Focus, must be taken into account when dealing with word order. Interestingly, some recent developments in syntactic theories have acknowledged the relevance of discourse-pragmatics, and have consequently implemented pragmatic relations within syntax in different ways (Kiss 1981; Rizzi 1997; Benincà 2001; Benincà & Poletto 2004; i.a.). Embracing these trends, research has recently reassessed the issue, showing that word order in Ancient Greek, far from being completely free, is subordinated to a complex set of factors which may find a systematisation within the most recent syntactic theories. Roughly, we can individuate three lines of approaches.

The first line of studies classifies Ancient Greek as a non-configurational language (Devine & Stephens 1999; Luraghi 2010; Ponti & Luraghi 2018; i.a.). Since Hale's (1982; 1983) works on Warlpiri, two types of languages have been distinguished, i.e. configurational and non-configurational ones (see also Hale 1989 on Navajo). Configurational languages obey traditional principles and orders imposed by the syntax, whereas non-configurational languages exhibit a constellation of phenomena which, at least in the Government and Binding framework (Chomsky 1981) adopted at that time, escape a formalisation in the standard syntactic model. Among these phenomena are free word order, discontinuous constituents and widespread pronoun drop. They surely remind one of some characteristics of Ancient Greek syntax. Hence, while configurational languages were proposed to display a hierarchically ordered underlying structure, non-configurational languages were claimed to lack it, and rather to generate sentences with a flat structure.

Building on this bipartite typology, works such as Luraghi (2010), Hewson & Bubenik (2006) and Ponti & Luraghi (2018) claimed that ancient Indo-European languages, among which is Ancient Greek, exhibit the same syntactic behaviour as the non-configurational languages mentioned above. By measuring the distribution of a group of non-configurational phenomena in ancient Indo-European languages and in their modern varieties, these authors further argued that these languages underwent a diachronic shift from non-configurationality to configurationality in their modern varieties.

Although this line of approaches revealed itself to be accurate in describing the wide range of word orders, various syntactic studies have cast doubt on the existence of non-configurationality and non-configurational languages in general. For instance, Baker (2001) points out that some properties of configurational languages still hold in Warlpiri, such as certain constraints on anaphors. In his view, the constellation of phenomena does not depend on a single property, i.e. a parameter of configurationality. Even more, Legate (2002) showed that with a more recent syntactic model, a configurational analysis of Warlpiri can be pursued.

The second group of analyses entertained the possibility that Ancient Greek conforms, at least to a certain extent, to universal structures. Taylor (1994) assumed that, being a natural language, Ancient Greek obeys configurationality, and that all possible word orders are derived from a base structure via a large set of possible movement rules. Her work further showed that it is possible to construct a simple model of usage that fits the observed Greek data and demonstrated that Ancient Greek undergoes a change from an OV to a VO syntax: while Homeric Greek is essentially verb-final, both verb-final and verb-medial phrase structures co-exist in Herodotus, whereas the Greek of the Hellenistic Koiné is largely verb-medial (see also Celano 2014). Further evidence in support of an OV grammar in Homeric Greek comes from the work by Windhearn (2021).

Assuming configurationality for Ancient Greek, other studies have focused on the architecture of the left periphery (Dal Lago 2010; Beschi 2011; Fogliani 2016; Rodeghiero 2017a; 2017b; Vai 2017; i.a.). By adopting Benincà & Poletto's (2004) proposal, which identifies a fine-grained hierarchy of syntactic positions to convey pragmatic and semantic information, Dal Lago (2010) analysed the left periphery in Xenophon's texts focusing on nominal prolepsis phenomena. She demonstrated that the cartographic approach is suited to account for word order in the Greek left periphery. A similar conclusion was reached by Rodeghiero (2017a; 2017b) in her study on the alternation between verbs with and without augment in Homer, as well as by Beschi (2011) in his work on Thucydides. All these studies have shown that

Ancient Greek word orders can be nicely captured by syntactic models, once it is assumed that Ancient Greek is a configurational language.

This conclusion is partly shared by a third kind of account. Unlike the studies mentioned in the second group, Goldstein (2016a) tests the configurationality assumption and qualifies Ancient Greek as a split-configurational language, i.e. a language in which some portions of the clause are flat, while others are hierarchically ordered. More precisely, a structure was proposed for the Ancient Greek clause in which the lower portion of the tree is flat up to a S(entence) node, while the highest domain, the CP, is hierarchically ordered. In this way, it is both possible to account for the properties specific to non-configurational languages and for the existence of information-structural factors regulating word order (see §5.4 for further details).

Notably, the three approaches make different predictions as far as the possible word orders in a given language are concerned. As for Ancient Greek, the first line of approach predicts a relative freedom of word orders, crucially not constrained by a hierarchy. Conversely, the second line of studies predicts the emergence of word orders which are fixed or mirror a hierarchy. The third approach predicts a different behaviour depending on whether the phenomena at issue relate to the lower or the higher portion of the clause. While no hierarchical order is expected for the elements realised in the lower projections, a structured order is expected for those moved to or merged in the CP layer.

In this paper we test the three approaches by investigating word orders in the TP layer, i.e. the layer between the verbal layer (VP), in which the semantic relations between the verb and its arguments are mapped, and the uppermost layer (CP), where the relations between the clause and the discourse-pragmatics are encoded. The TP layer expresses functional information about tense, aspect, mood and modality, and it takes scope over the event (the VP). Notice that, while a hierarchy has sometimes been envisaged for the higher sentential node, the TP domain has often either not been investigated in the studies on Ancient Greek or even dispensed with (as in Goldstein 2016a: 25).

3 Theoretical background

In this section, we outline the main theoretical tools which guided our analysis of the Ancient Greek data. Such tools date back to the 90's, but still have validity for research purposes, as shown in recent publications (see for example Schifano 2018; Wolfe 2020). Two operative principles are the basis of our paper.

i. The position of certain elements in the clause, and of adverbs in particular, is fixed and obeys a hierarchical order.

ii. The position of other constituents in the clause structure can be revealed by means of such fixed elements, and transitivity applies in predicting which word orders are possible.

Principle (ii) was formulated in Pollock's (1989) work, which showed that constituents such as adverbs, negative morphemes, and floating quantifiers do not undergo A-movement, and thus stay in their first-merged position in unmarked sentences. Hence, these elements can be used as markers to reveal the movement other constituents undergo. In particular, by looking at event-related adverbs and negation, Pollock was able to detect how far from the VP the verb moves in English and French. Sentence pairs such as (3) and (4) were used as diagnostics.

(3) V > Adv

(a) Jean embrasse souvent Marie.

(b) *John kisses often Mary.

(4) Adv > V

(a) *Jean souvent embrasse Marie.

(b) John often kisses Mary.

The contrasts reported above are due to longer or shorter movement of the verb, which raises past the adverb in French but not in English. Further evidence from tensed clauses and infinitives led Pollock to conclude that the supposed I(nflection)P(hrase) needed to be split into a higher T(ense)P(hrase) and a lower Agr(eement)P(hrase), in the middle of which a Neg(ation) P(hrase) may also intervene. Each of these projections hosts a head which can be the target of verb movement, depending on the type of sentence and the specific properties of the language. The movement of the verb consists of successive steps, and no movement to T is allowed if movement to lower heads has not occurred.

A further development of Pollock's analysis has been put forward by Cinque (1999), who showed that adverbs are not only unmovable (unless they undergo focalisation or other A-bar movements) but also merged in a fixed order (principle i above). Considering data from a wide range of languages, Cinque demonstrated that certain classes of adverbs are always ordered in the same way. Embracing Kayne's (1994) ideas about phrasal struc-

ture properties, Cinque refused to treat adverbs as cases of multiple adjunction, as was usually assumed in previous literature, and proposed that they are licenced as specifiers of dedicated functional projections, which enter the derivation in a fixed order (a proposal also put forward by Alexiadou 1997). Evidence for all the functional heads is found in the strict order of auxiliaries, verbal affixes and functional particles across languages, which mirrors that of adverbs.[1] Cinque's work is remarkable for the typological validation of the hierarchy it proposes. The hierarchy, which will be fundamental in what follows, is reported in (5) (from Cinque 1999: 106).[2]

(5) Cinque's (1999) hierarchy of adverbs

[*frankly* Mood(speech act) [*fortunately* Mood(evaluative) [*allegedly* Mood(evidential) [*probably* Mod(epistemic) [*once* T(past) [*then* T(future) [*perhaps* Mood(irrealis) [*necessarily* Mod(necessity) [*possibly* Mod(possibility) [*usually* Asp(habitual) [*again* Asp(repetitive 1) [*often* Asp(frequentative 1) [*intentionally* Mod(volitional) [*quickly* Asp(celerative 1) [*already* T(anterior) [*no longer* Asp(terminative) [*still* Asp(continuative) [*always* Asp(perfect?) [*just* Asp(retrospective) [*soon* Asp(proximative) [*briefly* Asp(durative) [*characteristically*(?) Asp(generic/progressive) [*almost* Asp(prospective) [*completely* Asp(sg.completive 1) [*tutto*[3] Asp(pl.completive) [*well* Voice [*fast/early* Asp(celerative 2) [*again* Asp(repetitive 2) [*often* Asp(frequentative 2) [*completely* Asp(sg.completive 2)]

The relation that governs the above hierarchy is a transitive one (principle ii).

1 The idea that morphological operations mirror syntactic ones dates back at least to Baker (1985).

2 One may wonder where such an extensive hierarchy comes from, and how much of it is present in actual clauses. Cinque (1999) claims that the most economical way to deal with it is to consider it as part of Universal Grammar, the order being determined by the human language faculty. The whole array of projections is allegedly always present in all sentences of all languages. In particular, even if a language does not show morphological evidence for the heads, the evidence for functional projections is given by adverbs.

Other interpretations have been proposed for the data, which try to reduce the amount of structure needed per sentence. Adger & Tsoulas (2004) assume that only those projections are present which are filled with phonological material in a sentence. Van Gelderen (2013), instead, suggests that functional features might be arranged in areas, in order to reduce the possible number of adverbs to consider. As for the source of the hierarchy, Ramchand & Svenonius (2014) reject the possibility that Universal Grammar includes such a rich functional hierarchy. They consequently try to derive it from the fundamental notion of scope and from the semantic interpretation of the functional fields of the clause (see also Pittner 2004). Other proposals have also been advanced on the placement of adverbs in the functional field (see for instance Ernst 2001, Frey 2003, Haumann 2007).

3 *Tutto* 'all' is an Italian quantifier which occupies a specific adverbial position when unstressed (Cinque 1999: 7).

Cinque (1999: 6) shows that transitivity can be used to predict the order of adverb pairs. If an adverb α precedes an adverb β, and the adverb β precedes an adverb γ, then the adverb α also precedes the adverb γ. Cinque (1999: 48) also showed that transitivity can be used to correctly predict the position of constituents other than adverbs. Let us consider two adverbs α and β, which are ordered so that α precedes β. If a constituent XP cannot follow α, it cannot follow β (see 6 a). Likewise, if a constituent XP cannot precede β, it cannot precede α (see 6 b). This is so because the ordering of a constituent and an adverb is not computed as the linear ordering between the two of them, but as the result of movement within the hierarchical clause structure.

(6) (a) If $\alpha > \beta$,
$*\alpha > \text{XP} \rightarrow *\beta > \text{XP}$

(b) If $\alpha > \beta$,
$*\text{XP} > \beta \rightarrow *\text{XP} > \alpha$

In this paper we embrace the idea, also developed in later works (see Cinque & Rizzi 2010 and Cinque 2013), that certain constituents are ordered in the clause, and that their order can be derived from a universal hierarchy of functional properties. Cross-linguistic evidence from typologically different languages robustly supports this claim. Since certain classes of adverbs precisely behave in this way, and do not move unless they undergo focalisation or left-dislocation, the position of an XP on the right or on the left of the adverb must be justified with the possibility of XP to move.

We show that evidence can be found for a strict order of functional projections also in Ancient Greek, and that the order crucially conforms to the universal order proposed in the literature. With these premises in mind, we now present the methods and the data.

4 Preliminary thoughts on the method

Much in the spirit of Pollock's (1989) and Cinque's (1999) works, we use adverbs as a revealing tool to detect the position of other constituents in the structure. In this section we clarify which adverbs are considered, and we explain how data were collected and prepared for the analysis.

4.1 The TP adverbs in Ancient Greek

Since the aim is to investigate word order in the TP layer, we focus on adverbs possibly first-merged in the TP. We restrict our domain to the portion of structure from the functional projection T(anterior) to Mod(epistemic) of

the hierarchy in (5). This choice is motivated by theoretical and empirical reasons. Both lower and higher adverbs have been claimed to exhibit a peculiar syntax: adverbs lower than T(anterior) usually interact in a complex way with actionality, e.g. telicity (Ramchand & Svenonius 2014), while adverbs higher than Mod(epistemic) may be heavily influenced by discourse (Giorgi 2016). Cross-linguistically, the portion of adverbial hierarchy we selected appears to be less influenced by scrambling and, more generally, by displacement phenomena.

With the help of the *Online Liddell-Scott-Jones Greek-English Lexicon* (henceforth LSJ), which can be referred to on the Thesaurus Linguae Graecae (henceforth TLG, Pantelia 2014), we selected nineteen temporal-aspectual adverbial phrases with a meaning corresponding to those individuated by Cinque (1999). In (7) we report the list of the adverbs considered, divided by functional head, with the corresponding translations.

(7) **Mod(epistemic)** *ek toû eikótos*, *katà tò eikós*, *tôi eikóti* 'in all likelihood';

T(present/past) *nûn* 'now', *tóte* 'at that time, then', *pálai* 'long ago';

Mood(irrealis) *ísōs*, *tákha* 'perhaps', *dḗpou* 'doubtless';

Asp(repetitive) *aûthis* 'again';

Asp(frequentative) *pollákis* 'often';

Asp(celerative) *katà tákhos*, *dià tákhous*, *dià takhéōn*, *takhú*, *oxéōs* 'quickly', *hóti tákhos* 'with all speed', *hóti tákhista* 'at the fastest/earliest';

T(anterior) *ḗdē* 'already'.[4]

Hence the working hypothesis is that the adverbs in (7) are ordered as in (8), along the hierarchy proposed by Cinque.

4 The functional adverbs considered here generally do not display the characteristic adverbial morpheme *-ōs*, which often derives manner adverbs from adjectives. The only exceptions are *oxéōs* and *ísōs*, the latter being only opaquely related to the adjective *ísos* 'equal'. Instead, many of these adverbs derive from other cells of the nominal-adjectival paradigm or are lexical entries on their own, and some consist of a more complex phrase involving a preposition or another element. Here we do not make distinctions between the superficial forms of the adverbials, e.g. PPs vs. single words, as to our knowledge no specific syntactic behaviour has been reported in the literature. Nor do we expect that any of these adverbs could behave like a clitic, its position being conditioned by the availability of a prosodic host. Notice that the only monosyllabic adverb in the list is *nûn*, which is clearly distinct from its clitic counterpart *nun*; the latter form is hardly used in Attic prose, and it rarely has a temporal meaning.

(8) [Mood(speech act) [Mood(evaluative) [Mood(evidential)
[*ek toû eikótos* Mod(epistemic) [*nûn* T(present/past) [*ísōs*
Mood(irrealis) [*aûthis* Asp(repetitive 1) [*pollákis*
Asp(frequentative 1) [*katà tákhos* Asp(celerative 1) [*ḗdē*
T(anterior) [Asp(terminative) [Asp(continuative) [Asp(perfect?)
[Asp(retrospective) [Asp(proximative) [Asp(durative)
[Asp(generic/progressive) [Asp(prospective)
[Asp(sg.completive 1) [Asp(pl.completive) [Voice
[Asp(celerative 2) [Asp(repetitive 2) [Asp(frequentative 2)
[Asp(sg.completive 2)]

Notice, however, that, according to the hierarchy in (5) and (8), some aspectual adverbs can be merged in two different positions. In the higher position, labelled 1, aspectual adverbs are merged in the TP portion of the clause and precede T(anterior). In the lower position, labelled 2, they are located below manner (Voice) adverbs. In the latter case, aspectual adverbs follow T(anterior). Although the two positions have been claimed to correspond to two distinct interpretations and to give rise to different scopal interactions (Cinque 1999), it was impossible for us to distinguish between high and low aspectual adverbs when they occurred alone in the clause, without other adverbial phrases. This means that we could not establish whether a given aspectual adverb was below or above T(anterior) when other adverbs were not present. Thus, in these cases, the relative order between aspectual and T(anterior) adverbs could not be determined. This issue leaves us with the adverbial hierarchy in (9) for Ancient Greek, in which aspectual adverbs are located both before and after T(anterior).

(9) [*ek toû eikótos* Mod(epistemic) [*nûn* T(present/past) [*ísōs*
Mood(irrealis) [*aûthis* Asp(repetitive 1) [*pollákis*
Asp(frequentative 1) [*katà tákhos* Asp(celerative 1) [*ḗdē* T(anterior)
[... [*katà tákhos* Asp(celerative 2) [*aûthis* Asp(repetitive 2) [*pollákis*
Asp(frequentative 2)]]]]]]]]]]]

4.2 Criteria for data collection

In this section we present the details about the collection of the data. The main corpus includes sentences from Thucydides's work (§4.2.1), but a further set of data about other Classical Attic prose writers was needed in order to specifically observe the relative order of adverbs in pairs (§4.2.2).

4.2.1 *The first corpus on Thucydides*

Our investigation of word order and adverb placement is based on the eight books of Thucydides' historical work in prose commonly known as the *History of the Peloponnesian War*. This work narrates the war since its beginning in 431 BCE. The events lasted until 404, but the story ends abruptly by the year 411, which suggests that the work was not completed. The 5th and the 8th book in particular show signs of negligence, and surely lack a final review by the author. Still, the overall work appears uniform in style and viewpoint, and it must look like what it was soon after Thucydides' endeavour ended (Lesky 2016: 556–557). Accordingly, Thucydides' *Histories* are a reliable prose text for the study of the Attic Greek of the 5th century BCE. The edition we used to study the text is that by Jones & Powell (1942), which is available on the TLG.

By using the TLG to search the target adverbs listed in (7), we extracted a total of more than a thousand sentences. These occurrences were further analysed according to the following parameters:

i. modification of an inflected verb,

ii. syntactic context,

iii. meaning of the adverb.

We included sentences in which the adverb unambiguously referred to an inflected verb. Accordingly, we excluded adverbs modifying adjectives or paired with nominals. In order to limit the syntactic variation within different structures, we restricted our analysis to finite sentences in indicative, subjunctive and optative mood. We excluded adverbs referring to imperatives, participles or infinitive forms which usually exhibit a peculiar syntax (see Rizzi 1982; Zanuttini, Pak & Portner 2012). Sentence (10) is an example of what is considered in our corpus: the verb is in the indicative mood and imperfect tense, and the adverb *ḗdē* 'already' modifies it. Sentence (11) exemplifies what is not included, since the verb modified by the adverb is a present participle.

(10) *πρὸς τούτους ἤδη ἐχώρουν.*
pròs toút-ous ḗdē ***e-khṓr-oun.***
PREP DEM-ACC.M.SG already PST-MOVE-IND.IPF.3PL
'They were already moving closer to them.'[5] [Thuc. 1.18.3]

5 All translations of Thucydides in this paper are based on the English version by Hobbes (1843) and the Italian version by Donini (1982). All translations of other texts follow those available

(11) *καὶ ἐν τούτῳ τῷ τρόπῳ μᾶλλον ἤδη ὄντες…*
kaì en=toút-ōi t-ôi tróp-ōi
and PREP=DEM-DAT.M.SG DET-DAT.M.SG manner-DAT.M.SG
mâll-on ḗdē ***ónt-es…***
much.CMPR-ADV already be.PART.PRES-NOM.M.PL
'And while they were already at this stage… ' [Thuc. 1.8.4]

Sentences were then excluded in which the adverb was immediately followed by a Wackernagel particle such as *mén*, *dé*, *gár*, etc. (as in 12).[6] Following an intuition put forth in the literature (see Dal Lago 2010; Goldstein 2016a: 26), we suspect such adverbs to have moved to the left periphery of the clause. Even if the association between pre-Wackernagel position and CP is by no means strict, we preferred to eliminate a potentially corrupt set of data.

(12) *ἤδη δὲ ἦν ὀψέ.*
ēdḗ ***dè*** *ê̂-n* *opsé.*
already PTCL be.IND.IPF-3SG late
'It was already late.' [Thuc. 1.50.5]

For the same reason, we excluded those sentences in which the adverb was separated from its verb by a subordinate clause (as in 13), thinking that it may be far from its base position within the TP.

(13) *καὶ νῦν [ἔχων σε μεγάλα ἀγαθὰ δρᾶσαι] πάρειμι.*
kaì ***nûn*** *[ékh-ōn=s-e* *megál-a*
and now have-PART.PRES.NOM.M.SG=2SG-ACC big-ACC.N.PL
agath-à drâ-sai] *pár-ei-mi.*
good-ACC.N.PL do-INF.AOR PREF-be_here.IND.PRES-1SG
'For the present, able to do you great service, I am here.'
[Thuc. 1.137.4]

Finally, we excluded those sentences in which adverbs were not used in their target meaning, as in (14), where *aûthis* does not mean 'again'.

on the Perseus Digital Library (Crane 1987), with slight modifications.

6 A list of the Greek clitic words can be found for instance in Goldstein (2016a: 6–7). We refer the reader to page 87 and following *ibidem* for a possible description of their domain of application.

(14) *καὶ αὖθις αἱ λοιπαὶ Μυτιλήνην ἀφιστᾶσιν.*
kaì ***aûthis*** *hai=loip-aì* *Mutilḗn-ēn*
and in_turn DET.NOM.F.PL=remaining-NOM.F.PL Mytilene-ACC.F.SG
ap-hist-âsin.
PREF-cause_to_revolt-IND.PRES.3PL
'And the rest in turn procured the revolt of Mitylene.' [Thuc. 8.22.2]

Special attention was paid to the value of the adverb *ḗdē*, which sometimes does not convey any meaning of anteriority, but rather a deictic temporal one (see sentence 15 below). This value is also reported in the LSJ. In §5.2 and §5.3, these cases are counted together with T(present/past) adverbs.

(15) *καὶ μετ' ἐκεῖνα ξυναμφότεροι ἤδη καὶ τὸν ἐν Ἄργει δῆμον κατέλυσαν.*
kaì *met'* *ekeîn-a* *xun-amphóter-oi* ***ē̃dē*** *kaì*
and PREP that-ACC.N.PL PREF-both-NOM.M.PL then and
t-òn *en=Árg-ei* *dê̂m-on*
DET-ACC.M.SG PREP=Argos-DAT.N.SG people-ACC.M.SG
kat-é-lu-san.
PREF-PST-dissolve-IND.AOR.3PL
'And then they both together dissolved the democracy at Argos.'
[Thuc. 5.81.2]

A final note is needed on how we dealt with the phenomenon of hyperbaton. Hyperbaton is a discontinuity phenomenon typical of Ancient Greek prose and poetry, in which a group of words can intrude within a constituent and split it. Discontinuous constituents have long represented a challenge for explaining word order patterns in Ancient Greek, and they have also been used as evidence for the non-configurational nature of its syntax (see §2). In this paper, relevant cases of hyperbaton are those involving main verbal arguments, namely subjects and direct objects, which may be separated from their modifiers, as in the following example.

(16) *καὶ τὰ πλοῖα ἤδη ἐκεῖ τὰ μεγάλα ὥρμει καὶ αἱ ταχεῖαι νῆες.*
kaì ***t-à*** ***ploî-a*** *ḗdē* *ekeî* ***t-à***
and DET-NOM.N.SG vessel-NOM.N.PL already there DET-NOM.N.SG
megál-a *hṓrm-ei* *kaì* *hai*
big-NOM.N.PL PST.lie_at_anchor-IMPF.3SG and DET.NOM.F.PL
takheî-ai *nē̂-es.*
fast-NOM.F.PL ship-NOM.F.PL
'And the big vessels and the fast ships were already lying there at anchor.' [Thuc. 7.4.5]

Adverbial class	Sentences
Mod(epistemic)	7
T(present/past)	158
Mood(irrealis)	19
Asp(repetitive)	44
Asp(frequentative)	4
Asp(celerative)	49
T(anterior)	102
Total	383

Table 1 Number of sentences for each adverbial class

Here the subject *tà ploîa tà megála* 'the big vessels' is split into two parts, with the adverbs occurring between them. In the few cases in which a hyperbaton crossed an adverb, we decided to always consider the leftmost word of the constituent in our analysis, i.e. *tà ploîa* in (16). The leftmost part has likely undergone movement, while the rightmost part might be in its base position. As will become clear in the next section, argument DPs are useful to the purpose of our discussion as far as their possible movement is concerned. Following Devine & Stephens (1999: 8), who claim that hyperbaton in Greek may have multiple clausal domains just like floating quantifiers,[7] we assume that the leftmost part of a constituent in hyperbaton may still be within the functional domain of the clause (TP), and is thus relevant to our purpose. Accordingly, in the above example, the subject is considered to occur on the left of the adverb.

Following these criteria, further analyses were performed on a total of 383 sentences, which became our main corpus. Table 1 illustrates the number of sentences analysed, divided for adverbial classes.

4.2.2 The second corpus on adverb pairs

To investigate the position of adverbs relative to each other, we employed the *proximity* tool available in the TLG, which allowed us to search for the co-occurrence of two adverbs within six words. We searched for all the adverb combinations, adopting the same criteria as described in §4.2.1, but also accepting adverbs not depending on a finite-tensed verb. The output of our

7 For a traditional view on floating quantifiers, see Sportiche (1988).

search consisted of only 4 sentences for the eight books of the *Histories*. Accordingly, to fully address this issue and to increase the number of relevant examples, we expanded the corpus and included four other Athenian prose writers born in the 5th century BCE, namely Isocrates, Lysias, Plato, and Xenophon. We performed the same paired search. We obtained 77 more sentences meeting the inclusion criteria discussed above and containing pairs of adverbs: 7 from Isocrates', 6 from Lysias', 47 from Plato's, and 17 from Xenophon's texts.

Those instances in which an adverb did not exhibit the target meaning were excluded. This happened for 8 sentences. To exemplify, let us consider the Mood(irrealis) adverb *dḗpou*. According to the LSJ, this adverb can have both the meaning of 'perhaps' (mostly Homeric) and its opposite meaning 'certainly' (mostly Attic); it sometimes shows an evidential hint ('I suppose'; see also Van Rooy 2016), and it can also be used in questions implying a positive answer. Just like in the simple search, in the proximity search too we only included those sentences in which the adverb could be paraphrased as 'of course' as in (17 a), while we excluded those in which its meaning was other as in (17 b).[8]

(17) (a) *οὔτε γὰρ ἅρμα δήπου ταχὺ γένοιτ' ἂν βραδέων ἵππων ἐνόντων οὔτε δίκαιον ἀδίκων συνεζευγμένων.*
oú-te gàr hárma ***dḗpou*** *takh-ù*
NEG-and PTCL chariot.NOM.N.SG of_course fast-ADV
gén-oit' àn brad-éōn hípp-ōn
happen-OPT.AOR.3PL MOD slow-GEN.M.PL horse-GEN.M.PL
en-ónt-ōn oú-te díkai-on
PREF-be_in-PART.PRES.GEN.M.PL NEG-and even_going-NOM.N.SG
adík-ōn
unmanageable-GEN.M.PL
sun-e-zeug-mén-ōn.
PREF-PF-yoke_together-PART.PF-GEN.M.PL
'A chariot of course would not go fast, if slow horses were attached to it, nor would it be serviceable if horses unfit for service were harnessed to it.' [Xen. Cyrop. 2.2.26]

8 According to our interpretation, in sentence (17 b) the adverb *dḗpou* only conveys emphasis on the predicate. Another possible interpretation is that it also connotes a nuance of evidentiality. The lack of clarity as to its meaning is a further reason not to consider this occurrence in our data.

(b) *ἂν δὲ καὶ ἀμφότερα στέρξωσι, τὸ μὲν τῆς ὥρας ἄνθος ταχὺ δήπου παρακμάζει.*
àn dè kaì amphóter-a stérx-ōsi,
if.MOD PTCL and both-ACC.N.PL love-SUBJ.AOR.3PL
t-ò mèn t-ês hṓr-as
DET-NOM.N.SG PTCL DET-GEN.F.SG time-GEN.F.SG
ánthos takh-ù ***dḗpou***
flower.NOM.N.SG fast-ADV PTCL
par-akmáz-ei.
PREF-be_past_the_prime-IND.PRES.3SG
'But even if they are satisfied (i.e. in love) on both scores, yet the bloom of youth soon passes its prime.' [Xen. Sym. 8.14]

In addition to what we have already discussed, in the second search we introduced a further criterion to deal with the adverb *ḗdē* 'already' in combination with temporal adverbs. According to the LSJ, the adverb *ḗdē* can be joined with other words of time forming a complex constituent. Hence, we only included those sentences in which the temporal adverbs and the adverb *ḗdē* are separated by at least one (non-clitic) word as in (18), which amount to 9 occurrences. Conversely, we excluded all the 32 instances in which the two adverbs are linearly adjacent, as in (19).

(18) *ὡς καὶ νῦν Δέξιππος ἤδη διέβαλλεν αὐτὸν πρὸς Ἀναξίβιον ὅ τι ἐδύνατο.*
hōs ***kaì nûn*** *Déxipp-os* ***ḗdē***
COMP and now Dexippus-NOM.M.SG already
di-é-ball-en aut-òn pròs
PREF-PST-calumniate-IND.IPF.3SG 3SG-ACC.M PREP
Anaxíbi-on hó=ti e-dúna-to.
Anaxibius-ACC.M.SG REL=ACC.N.SG PST-can-IND.AOR.3SG
'For even now Dexippus has already been falsely accusing him, as far as he could, to Anaxibius.' [Xen. Anab. 6.1.32]

(19) (a) *οὕτως ἤδη τότε πόρρω τῆς ἡλικίας ἦν, ὥστ', εἰ καὶ μὴ τότε, οὐκ ἂν πολλῷ ὕστερον τελευτῆσαι τὸν βίον.*
hoút-ōs ***ḗdē*** ***tóte*** *pórrhō t-ês hēlikí-as*
SO-ADV already then forward DET-GEN.F.SG age-GEN.F.SG
ês̑n, hṓs-t', ei kaì mè̀ tóte, ouk àn
be.IND.IPF.3SG COMP-PTCL if and NEG then NEG MOD
poll-ôi húster-on teleutê̂-sai t-òn
much-DAT.N.SG later-ADV end-INF.AOR DET-ACC.M.SG
bí-on.
life-ACC.M.SG

'He had already reached such an age, that had he not died then, death must have come to him soon after.' [Xen. Mem. 4.8.1]

(b) *ἀλλὰ μὴν καὶ γείτονές γ' εἰσὶν αὐτοῖς Θρᾷκες οἱ ἀβασίλευτοι, οἳ θεραπεύουσι μὲν καὶ νῦν ἤδη τοὺς Ὀλυνθίους.*
allà mèn kaì geíton-és=g'=ei-sìn
but PTCL and neighbour-NOM.M.PL=PTCL=be-IND.PRES.3PL
aut-oîs Thrâik-es
3PL-DAT.M Thracian-NOM.M.PL
hoi=abasíleut-oi, hoì
DET.NOM.M.PL=without_king-NOM.M.PL REL.NOM.M.PL
*therapeú-ousi mèn kaì **nûn** **ēdē** t-oùs*
pay_court-IND.PRES.3PL PTCL and NOW PTCL DET-ACC.M.PL
Olunthí-ous.
Olynthian-ACC.M.PL
'And further they have for neighbours those Thracians who are under no king, who even now are paying court to the Olynthians.' [Xen. Hell. 5.2.17]

Following these criteria, the number of sentences considered for the second corpus on adverb pairs was 41. These are used for the analysis in §5.1. The details about the adverb pairs found and the frequency of every pair are given in that section and in Table 2.

5 The proposal

In this section, we demonstrate that the clausal structure of Ancient Greek includes a TP layer, and that the TP layer is structured as an ordered set of functional projections merged in a hierarchical way. To prove our claim, we provide three arguments, which concern the relative order of adverbs in the clause (§5.1), the movement of the verb across the adverbs (§5.2), and the position of subject and object DPs with respect to the adverbs (§5.3). We show that one and the same functional hierarchy applies to the phenomena considered, which is in line with the cartographic framework. In §5.4 we make some further observations on the results and compare our approach to the hypothesis of a split-configurational clause structure.

5.1 The relative order of adverbs

The first argument in support of a hierarchical TP layer in Ancient Greek comes from the relative order of adverbs. As described in §4.2.2, we used the *proximity* tool of the TLG to extract occurrences containing adverb pairs,

and we determined the order in which the two adverbs were placed with respect to each other. In (20) we repeat the hierarchy proposed in (9), which is based on Cinque (1999).

(20) [*ek toû eikótos* Mod(epistemic) [*nûn* T(present/past) [*ísōs* Mood(irrealis) [*aûthis* Asp(repetitive 1) [*pollákis* Asp(frequentative 1) [*katà tákhos* Asp(celerative 1) [*ḗdē* T(anterior) [... [*katà tákhos* Asp(celerative 2) [*aûthis* Asp(repetitive 2) [*pollákis* Asp(frequentative 2)]]]]]]]]]]]

If adverbs follows the hierarchy in (20), we expect that for any adverb pair the two adverbs exhibit an order such that, if one is higher than the other, the former precedes the latter. For instance, given the adverb pair *nûn–pollákis*, *nûn* 'now' is expected to precede *pollákis* 'often', since the former is higher – being merged in T(present/past) – than the latter – Asp(frequentative). In almost all of the occurrences the relative order between the two adverbs of the adverb pairs is consistent with the hierarchy proposed in (20).[9] We illustrate the relative ordering with examples from (21) to (31). The results for each pair of functional heads are summarised in Table 2.

(21) Mod(epistemic) > T(present/past): *ek toû eikótos* > *nûn*

τὰς μὲν νενικήκατε ἤδη ναυμαχίας, τὴν δ' ἐκ τοῦ εἰκότος νῦν νικήσετε.
t-às *mèn* *ne-nikḗ-kate* *ḗdē* *naumakhí-as,*
DET-ACC.F.PL PTCL PF-win-IND.PF.2PL already naval_battle-ACC.F.PL
t-ḕn *d'* ***ek=t-oû*** ***eikót-os*** ***nûn***
DET-ACC.F.SG PTCL PREP=DET-GEN.N.SG likely-GEN.N.SG now
nikḗ-sete.
win-IND.FUT.2PL
'You have already won the other naval combats, and in likelihood you shall now win this.' [Thuc. 6.66.2]

9 The only exception is discussed below, as example (35).

(22) T(present/past) > Mood(irrealis): *nûn* > *ísōs*

καὶ νῦν ἴσως ποιήσουσιν ἅπερ καὶ πρότερον ἦσαν εἰθισμένοι καὶ δημόται καὶ φίλοι κλαίοντες ἐξαιτεῖσθαι αὐτοὺς παρ' ὑμῶν.
kaì ***nûn*** ***ísōs*** *poiê-sousin* *há-per* *kaì*
and now perhaps do-IND.FUT.3PL REL.ACC.N.PL-PTCL and
próter-on *ê̂-san* *eithis-ménoi* *kaì*
before-ADV be.AUX.IND.IPF-3PL accustom-PART.PF.PASS.NOM.M.PL and
dēmót-ai *kaì* *phíl-oi* *klaí-ont-es*
commoner-NOM.M.PL and friend-NOM.M.PL cry-PART.PRES-NOM.M.PL
ex-aiteî-sthai *aut-oùs* *par'* *hum-ô̂n.*
PREF-demand-INF.PRES.PASS 3PL-ACC PREP 2PL-GEN
'So now, perhaps, they will do what they were used to do before, and fellow-townsmen and friends will cry out and implore you to spare them.' [Lys. 27 12]

(23) T(present/past) > T(anterior): *tóte* > *ḗdē*

καὶ ἄλλαι γε οἶμαι πόλεις τότε κατῴκουν ἤδη πολλαί, πληθυόντων τῶν ἀνθρώπων.
kaì *áll-ai=ge* *oî-mai* *pól-eis* ***tóte***
and other-NOM.F.PL=PTCL believe-IND.PRES.1SG city-NOM.F.PL then
kat-ő̂ik-oun ***ḗdē*** *poll-aí,*
PREF-be_situated-IND.IPF.3PL already many-NOM.F.PL
plēthu-ónt-ōn *t-ô̂n* *anthrő̂p-ōn.*
multiply-PART.PRES-GEN.M.PL DET-GEN.M.PL man-GEN.M.PL
'By this time, too, as mankind multiplied, many other cities had been founded.' [Plat. Laws 3.682c]

(24) T(present/past) > Asp(celerative): *tóte* > *takhú*

ταῦτα δὴ τὰ μεγάλα οὕτως προσδοκώμενα διέπτατο, ὡς ἔοικε, τότε ταχύ.
taût-a *dḕ* *t-à* *megál-a* *hoút-ōs*
DEM-NOM.N.PL PTCL DET-NOM.N.PL big-NOM.N.PL SO-ADV
pros-dokő̂-men-a *di-é-pta-to,*
PREF-expect-PART.PRES.PASS-NOM.N.PL PREF-PST-vanish-IND.AOR.3SG
hōs *é-oi-ke,* ***tóte*** ***takh-ú.***
as PF-seem-IND.PF.3SG then fast-ADV
'But these great expectations then vanished speedily, it seems.' [Plat. Laws 3.686a]

(25) Mood(irrealis) > Asp(repetitive): *ísōs* > *aûthis*

σωθέντες μὲν γὰρ ἴσως ἂν αὖθις ἔτι ποτὲ ἐν καιρῷ ὑμῖν γενοίμεθα.
sō-thént-es mèn gàr ***ísōs*** *àn* ***aûthis***
save-PART.AOR.PASS-NOM.M.PL PTCL PTCL perhaps MOD again
éti=potè en=kair-ôi hum-în gen-oímetha.
still=ever PREP=advantage-DAT.M.SG 2PL-DAT be-OPT.AOR.1PL
'For if we are saved, we might perhaps make ourselves useful to you again at some future time.' [Xen. Hell. 7.4.8]

(26) *οὔτε γὰρ ἅρμα δήπου ταχὺ γένοιτ' ἂν βραδέων ἵππων ἐνόντων οὔτε δίκαιον ἀδίκων συνεζευγμένων.*
oú-te gàr hárma ***dḗpou*** ***takh-ù***
NEG-and PTCL chariot.NOM.N.SG of_course fast-ADV
gén-oit' àn brad-éōn hípp-ōn
happen-OPT.AOR.3PL MOD slow-GEN.M.PL horse-GEN.M.PL
en-ónt-ōn oú-te díkai-on
PREF-be_in-PART.PRES.GEN.M.PL NEG-and even_going-NOM.N.SG
adík-ōn sun-e-zeug-mén-ōn.
unmanageable-GEN.M.PL PREF-PF-yoke_together-PART.PF-GEN.M.PL
'A chariot of course would not go fast, if slow horses were attached to it, nor would it be serviceable if horses unfit for service were harnessed to it.' [Xen. Cyrop. 2.2.26]

(27) Mood(irrealis) > T(anterior): *ísōs* > *ḗde*

ἀλλ' ὥσπερ ἴσως ἤδη καὶ σὺ ἀκήκοας τῶν ἀγαθῶν ἰατρῶν…
all' hṓs-per ***ísōs*** ***ḗdē*** *kaì sù ak-ḗko-as*
but COMP-PTCL perhaps already and 2SG.NOM PF-hear-IND.PF.2SG
t-ôn agath-ôn iatr-ôn…
DET-GEN.M.PL good-GEN.M.SG doctor-GEN.M.SG
'But as you have perhaps already heard good doctors say…'
[Plat. Charm. 156b]

(28) Asp(repetitive) > Asp(frequentative): *aûthis* > *pollákis*

Σωκράτει γὰρ καὶ αὖθις ἔσται πολλάκις διαλέγεσθαι.
Sōkrát-ei gàr kaì ***aûthis*** *és-tai*
Socrates-DAT.M.SG PTCL and again be_possible.IND.FUT-3SG
pollákis *dia-lége-sthai.*
often PREF-argue-INF.PRES
'For it will be possible to argue again multiple times with Socrates.'
[Plat. Sym. 94e]

(29) Asp(repetitive) > Asp(celerative): *aûthis* > *takhú*

καὶ αὖθις ταχὺ ὑπολαβὼν ὁ Διονυσόδωρος, ἵνα μὴ πρότερόν τι εἴποι ὁ Κτήσιππος…
kaì ***aûthis takh-ù*** *hupo-lab-ὼn*
and again fast-ADV PREF-interrupt-PART.AOR.NOM.M.SG
ho=Dionusódōr-os, hína mὲ
DET.NOM.M.SG=Dionysodorus-NOM.M.SG in_order_that NEG
próter-ón=ti eíp-oi
before-ADV=INDF.ACC.N.SG say-OPT.AOR.3SG
ho=Ktḗsipp-os…
DET.NOM.M.SG=Ctesippus-NOM.M.SG
'Hereupon Dionysodorus struck in again quickly, lest Ctesippus should get a word in before him… ' [Plat. Euthyd. 298e]

(30) Asp(celerative) > T(anterior): *hóti tákhista* > *ḗdē*

οὐδενὶ τρόπῳ οἱ ἔφη ἀρέσκειν ἐν τῷ αὐτῷ ἔτι μένειν, ἀλλ᾽ ὅτι τάχιστα ἤδη ἐξανίστασθαι καὶ μὴ μέλλειν.
oud-enì tróp-ōi=hoi é-ph-ē
NEG-DAT.M.SG manner-DAT.M.SG=3SG.DAT PST-say-IND.AOR.3SG
arésk-ein en=t-ôi aut-ôi éti
please-INF.PRES PREP=DET-DAT.M.SG same-DAT.M.SG still
mén-ein, all' hóti ***tákhist-a ḗdē***
stay-INF.PRES but COMP fastest-ADV already
ex-an-ísta-sthai kaì mὲ méll-ein.
PREF-PREF-raise-INF.PRES.MID and NEG delay-INF.PRES
'He said, he by no means liked to stay where they were, but with all speed to arise and be gone, no longer delaying the matter.'
[Thuc. 7.49.3]

Adverb pair	**Sentences**
Mod(epistemic) > T(present/past)	1
T(present/past) > Mood(irrealis)	8
T(present/past) > T(anterior)	9
T(present/past) > Asp(celerative)	1
Mood(irrealis) > T(present/past)	1
Mood(irrealis) > Asp(repetitive)	1
Mood(irrealis) > Asp(celerative)	1
Mood(irrealis) > T(anterior)	2
Asp(repetitive)> Asp(frequentative)	2
Asp(repetitive) > Asp(celerative)	1
Asp(celerative) > T(anterior)	1
Asp(frequentative) > T(anterior)	10
T(anterior) > Asp(frequentative)	3
Total	41

Table 2 Number of sentences for each adverb pair

(31) Asp(frequentative) > T(anterior): *pollákis* > *ḗdē*

ἀλλ᾽ οὕτω τὸ γῆράς ἐστι δυσάρεστον καὶ μικρολόγον καὶ μεμψίμοιρον ὥστε πολλάκις ἤδη τήν τε φύσιν τὴν ἐμαυτοῦ κατεμεμψάμην.
all᾽ hoút-ō t-ò gêrás=es-ti
but SO-ADV DET-NOM.N.SG old_age-NOM.N.SG=be.IND.PRES-3SG
dusárest-on kaì mikrológ-on kaì
fastidious-NOM.N.SG and captious-NOM.N.SG and
mempsímoir-on hṓs-te ***pollákis ḗdē***
querulous-NOM.N.SG COMP-PTCL often already
t-ḗn=te phús-in t-ὲn emaut-oû
DET-ACC.F.SG=and nature-ACC.F.SG DET-ACC.F.SG 1SG-GEN
kat-e-memp-sámēn.
PREF-PST-blame-IND.AOR.1SG
'On the contrary, my old age is so morose and captious and discontented that I have oftentimes already found fault with my nature.' [Isoc. 12 8]

Combining the orders of each adverb pair and applying the transitivity property to the word orders attested, we are able to demonstrate that the Ancient Greek adverbs follow the hierarchy in (20). Due to the lack of relevant examples, the relative order between Asp(frequentative) and Asp(celerative) could not be determined. Accordingly, we revise the hierarchy in (20) leaving the order between *pollákis* 'often' and *katà tákhos* 'fast' unspecified.

(32) [*ek toû eikótos* Mod(epistemic) [*nûn* T(present/past) [*ísōs* Mood(irrealis) [*aûthis* Asp(repetitive 1) [*pollákis* Asp(frequentative 1) / *katà tákhos* Asp(celerative 1) [*ḗdē* T(anterior)]]]]]]

In addition, as stated in §4.1, the aspectual adverbs can occur in two positions, i.e. TP- or vP-internal. This is confirmed by three occurrences in which *ḗdē* 'already' precedes *pollákis* 'often'. No occurrences were extracted of *ḗdē* preceding the other two aspectual adverbs.

Unlike the instances in which the aspectual adverbs occurred individually, it was possible to detect semantic differences when *pollákis* 'often' was combined with *ḗdē* 'already' depending on their relative order. According to Cinque (1999: 205), when the aspectual frequentative adverb is in TP, thereby preceding T(anterior), it takes scope over the whole event. Conversely, when the aspectual frequentative is in vP and follows T(anterior), it quantifies over the process or state encoded in the VP. This difference can be observed when comparing sentences (33 a) and (33 b). In (33 a) the frequentative adverb has scope on the entire event and precedes T(anterior): the meaning is akin to 'it has happened many times that we have proposed that'. In (33 b) it modifies the VP portion with a meaning similar to 'those things which it has happened that we said many times'.

(33) (a) *μὴ θαυμάσωμεν δὲ εἰ πολλάκις ἤδη προθέμενοι ἄττα, εἰρήκαμεν ὅτι πρὸς ταῦτα δεῖ νομοθετεῖν βλέποντα τὸν νομοθέτην…*
*mḕ thaumá-sōmen dè ei=**pollákis** **ḗdē***
NEG wonder-SBJV.AOR.1PL PTCL if=often already
pro-thé-men-oi átta,
PREF-propose-PART.AOR.MID-NOM.M.PL REL.INDF.ACC.N.PL
eirḗ-kamen hóti pròs taût-a d-eî
say-IND.PF.1PL COMP PREP DEM-ACC.N.PL need-IND.PRES.3SG
nomothet-eîn blép-ont-a t-òn
frame_laws-INF.PRES watch-PART.PRES-ACC.M.SG DET-ACC.M.SG
nomothét-ēn…
lawgiver-ACC.M.SG…
'Nor let it surprise us that, while we have often already

proposed ends which the legislator should, as we say, aim at in his legislation… ' [Plat. Laws 3.693]

(b) διομολογησάμενός γ', ἔφην ἐγώ, καὶ ἀναμνήσας ὑμᾶς τά τ' ἐν τοῖς ἔμπροσθεν ῥηθέντα καὶ ἄλλοτε ἤδη πολλάκις εἰρημένα.
di-omologē-sámen-ós=g', *é-ph-ēn*
PREF-agree-PART.AOR.MID-NOM.M.SG=PTCL PST-say-IND.AOR.1SG
egṓ, *kaì* *ana-mnḗ-sas* *hum-âs*
1SG.NOM and PREF-recall-PART.AOR-NOM.M.SG 2PL-ACC
t-á=t' *en=t-oîs* *émpros-then*
DET-ACC.N.PL=and PREP=DET-DAT.N.PL before-ADV
rhē-thént-a *kaì* *áll-ote* ***ḗdē*** ***pollákis***
say-PART.AOR.PASS-ACC.N.PL and else-when already often
eirē-mén-a.
say-PART.PF.PASS-ACC.N.PL
'Yes, I said, after first coming to an understanding with you and reminding you of what has already been said here often on other occasions.' [Plat. Laws 3.693c]

We can conclude that the pattern exhibited in the three occurrences in which *ḗdē* 'already' precedes *pollákis* 'often' is consistent with the hierarchy in (20). When *ḗdē* precedes *pollákis*, *pollákis* is merged lower, i.e. in the Asp(frequentative 2) projection.

(34) [*ek toû eikótos* Mod(epistemic) [*nûn* T(present/past) [*ísōs* Mood(irrealis) [*aûthis* Asp(repetitive 1) [*pollákis* Asp(frequentative 1) / *katà tákhos* Asp(celerative 1) [*ḗdē* T(anterior)]]]]]]

In our corpus, only one occurrence exhibits a relative order divergent from the prediction. In sentence (35) the Mood(irrealis) adverb *ísōs* 'perhaps' precedes the T(present/past) adverb *nûn* 'now', thereby showing the opposite word order to what is expected under Cinque's hierarchy.

(35) ἴσως οὐδ' ἂν νῦν ἐπεχείρουν ἀποφαίνεσθαι περὶ τῶν σοὶ συμβεβηκότων.
ísōs *ou-d'* *àn* ***nûn*** *ep-e-kheír-oun*
perhaps NEG-PTCL MOD now PREF-PST-endeavour-IND.IPF.3.PL
apo-phaíne-sthai *perì* *t-ôn* *s-oì*
PREF-display-INF.PRES.MID PREP DET-GEN.N.PL 2SG-DAT
sum-be-bē-kót-ōn.
PREF-PF-happen-PART.PF-GEN.N.PL
'Perhaps even now I should not be undertaking to declare my view concerning what has happened to you.' [Isoc. L. 2 1]

We propose that the exceptional word order between the two adverbs in this occurrence does not constitute a problem for our claim. In sentence (35), the adverb *ísōs* 'perhaps' plausibly takes scope over *oud' àn nûn* 'not even now', which is clearly focal, and not over the matrix verb. This possibility is also available for the Italian equivalent *forse* (Cinque 1999: 31; see also Belletti 1990: 130, fn. 29), which sometimes forms a constituent with the element it takes scope over.

To conclude, our data demonstrate that the relative order of adverbs in Ancient Greek obeys Cinque's (1999) hierarchy. The patterns we observe can only be explained if we assume that TP is hierarchically organised. From a purely probabilistic point of view, the occurrence of a pair of adverbs has a probability of $1/2$ to match the universal order stipulated. For a number n of adverb pairs, the probability that they all match the functional hierarchy is $1/2^n$. If we consider the 23 occurrences where the order of adverbs is independent of the multiple positions available to some aspectual adverbs, the probability for them to all match the predicted order by chance is of only $1/2^{23}$. Under a flat-structure hypothesis, a clause structure in which the constituents all symmetrically c-command each other cannot account for a strict linear sequence of a group of them, namely adverbs; quite the opposite, such a structure is specifically designed to allow freedom of ordering. Adverbs would be all on the same level, and syntax would merge them all together in a flat phrase structure. The hierarchical TP hypothesis instead offers a straightforward explanation for the phenomenon observed here: one fixed order is predicted to be baseline, and every possible exception is explained through movement or other syntactic derivations.

5.2 The movement of the verb across the adverbs

The second argument in support of our claim is the position of the predicate with respect to the adverbs. In the literature, there is no consensus on the verb placement in Ancient Greek. Some works consider Ancient Greek to be fundamentally SOV (see Frischer et al. 1999; Devine & Stephens 1999; Dal Lago 2010), while others adopt an SVO analysis (see Meier-Brügger 1992). In this paper we do not propose a solution to this issue (but see §5.4 for a conjecture); we rather show that the verb can occupy several positions in the clause, and that it is not restricted to preceding or following any given constituent. We formalise this variability in placement in terms of movement: the verb is allowed to move out of its base position and to land on another available site, within the domain of the clause phrase.[10]

10 What reasons cause its movement remains a topic for future research.

Since Pollock (1989), adverbs have been used to reveal how far from the VP the verb moves in the clause structure (see §3). We apply the same rationale to the Ancient Greek occurrences in Thucydides, i.e. to a total of 383 examples containing a finite verb and at least one adverb, as described in §4.2.1. Our results show that most adverbs can occur both on the right and on the left of the finite verb. For instance, the adverb *ḗdē* 'already', which can be associated with the T(anterior) head in most of its interpretations, appears on the right of the finite predicate in (36 a) and on its left in (36 b).

(36) (a) V > Adv

διότι τὸ μὲν λυποῦν ἔχει ἤδη τὴν αἴσθησιν ἑκάστῳ.
dióti t-ò mèn lup-oûn
because DET-NOM.N.SG PTCL grieve-PART.PRES.NOM.N.SG
ékh-ei ḗdē t-ḕn aísthēs-in
have-IND.PRES.3SG already DET-ACC.F.SG sensation-ACC.F.SG
hekást-ōi.
each-DAT.M.SG
'Because everyone's senses are already gripped by grief.'
[Thuc. 2.61.2]

(b) Adv > V

ὡς τυραννίδα γὰρ ἤδη ἔχετε αὐτήν.
hōs turannís-a gàr ***ḗdē ékh-ete***
as tyranny-ACC.F.SG PTCL already have-IND.PRES.2PL
aut-ḗn.
3SG-ACC.F
'For the government you have is already a tyranny.'
[Thuc. 2.63.2]

Notice that both occurrences are taken from the second book of the *Histories* and are part of Pericles' second speech, only separated by a couple of paragraphs. The same verb *ékhō* 'to have' occurs together with the adverb *ḗdē* 'already' and is not used as an auxiliary in either occurrence. The syntactic context of (36 a) and (36 b) is very similar: only one constituent occupies the first position of the clause followed by a Wackernagel particle, and the direct object follows both the verb and the adverb. Hence, the two occurrences can be easily compared. Despite these similarities, the verb once precedes (in 36 a) and once follows (in 36 b) the adverb. Therefore, it seems that the finite verb can occur either to the left or to the right of an adverb.

We performed a quantitative analysis of the data to verify whether there were some tendencies in terms of frequency in the word orders attested. This

analysis reveals that the verb is more frequently located on the right of adverbs. Out of 383 examples of sentences with a verb and an adverb, 290 occurrences (76%) showed the order Adv>V. Conversely, the verb preceded an adverb in 93 cases (24%), thereby exhibiting the order V>Adv. This distribution holds independently of the type of verb, i.e. whether lexical or light verbs.[11]

In order to refine our analysis, we performed a deeper investigation of the verb-adverb orders looking at the position of the verb in relation to each adverbial class. In this respect, the flat-structure and the hierarchical hypotheses make two different predictions. In a flat structure, the verb and the adverb are merged on the same level under the S(entence) node. If different adverbs are merged under the S node in an unordered and free way, the verb is predicted to be located with an equal probability in any position, both preceding and following all adverb types (as represented in 37). Hence, no difference in the verb position can be detected depending on the adverb type.

(37) Flat structural representation
[$_S$ (AdvP) V (AdvP)]

Conversely, in a hierarchical structure where functional projections are present and ordered, adverbs are merged at different heights, and multiple positions are available for the verb, which moves between them (Cinque 1999: 131). Hence, under this option, the probability for the verb to be placed to the right or the left of an adverb depends on the height of merge of the adverb. Let us assume, as a null hypothesis, that all the possible landing sites within the TP layer are reached by the verb with the same frequency. A lower adverb will nevertheless count a greater number of verb occurrences on its left than a higher adverb, since more landing sites are available. In the structure outlined in (38), if each verb position is occupied with the same frequency, a verb will have a probability of 2/3 to precede Adv_2P and a probability of only 1/3 to precede Adv_1P. We then expect the frequency with which the order

11 If we only consider lexical verbs, the figures are almost same as the whole set of data: the order Adv>V is attested with a frequency of 76 per cent. If we only consider functional verbs such as copulas, auxiliaries and modals, we observe a slight lowering of the frequency of the order Adv>V, which is now of 71 per cent. However, the total amount of functional verbs in the data is only 42. If we suppose that the probability for a functional verb to occur after an adverb is the same as for a lexical verb (i.e. $p = 0.76$), and we adopt a binomial distribution of the event, we find that the standard deviation for $n = 42$ trials is $\sigma = \sqrt{np(1-p)} = 2.8$. The frequency of the event "Adv>V" for functional verbs (71%, i.e. 30) differs less than σ from the expected value (76%, i.e. 32); we can thus say that the difference between lexical and functional verbs is not statistically significant, and hypothesise that verbs follow adverbs with the same probability independently of their functional or lexical status.

Adverbial class	**Adv > V**	**%**	**V > Adv**	**%**	**Total**
Mod(epistemic)	7	100	0	0	7
T(past)	138	87	20	13	158
Mood(irrealis)	16	84	3	16	19
T-Asp	129	65	70	35	199
Total	290	76	93	24	383

Table 3 Frequencies of Adv>V and V>Adv across adverbial classes

V>Adv occurs to increase the lower the adverb is in the structure.

(38) Hierarchical structural representation
[$_{TP}$ (V) [Adv_1 P [(V) [Adv_2 P [(V)]]]]]

To test the two opposite predictions, we calculated how many times the finite verb precedes and follows a given adverb in the 383 occurrences of the *Histories*. We divided our adverbs into groups according to their functional category and their position in the hierarchy. Since the aspectual adverbs can have two different positions in the hierarchy, one below and one above T(anterior) (see §4.1), we collapsed the T(anterior) and the Asp(cel./rep./freq.) together in one T-Asp functional category. Accordingly, we considered Mod(epistemic), T(past), Mood(irrealis) and T-Asp as the four adverbial classes. Table 3 illustrates the raw number and the percentages of the two word-orders, Adv>V and V>Adv, for each adverbial class.

Table 3 shows that for each adverbial class the order Adv>V is more frequent than the reversed order, thus confirming the general trend observed above. In addition, V>Adv appears more frequently when the adverb is part of the T-Asp class than with the other adverbs. Conversely, the mirror order Adv>V is more frequently found when the adverbs are Mod(epistemic), followed by T(past) and Mood(irrealis). The descriptive observations were confirmed by the χ^2 test, evaluating the null hypothesis that the two word orders had the same distribution. The analysis revealed that the overall frequency of the two word orders significantly differs (χ^2 27.45, df 3, $p < 0.001$). The frequency of the order V>Adv increases the lower the adverb is merged in the functional hierarchy and, conversely, the frequency of the order Adv>V increases the higher the adverb is merged. The expected numbers for the order Adv>V are higher for T-Asp adverbs than the actual numbers, and vice

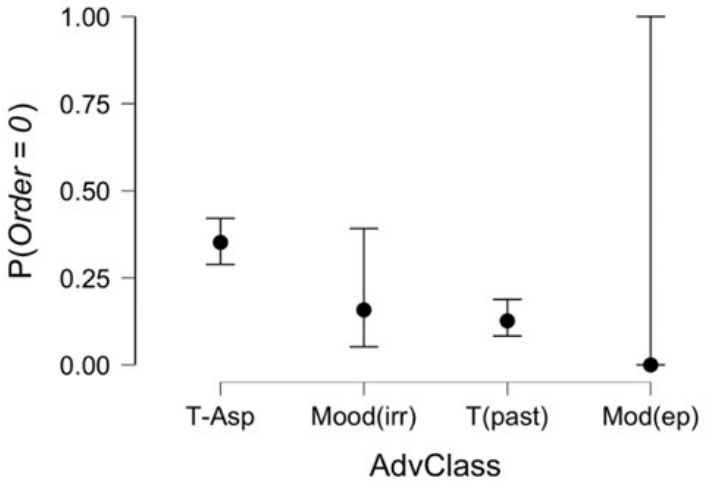

Figure 1 Estimated marginal means: probability of observing the order V>Adv for each adverb class.

versa the expected numbers for the order V>Adv for the same class are lower. Conversely, for all the other three classes the expected values for the order Adv>V are lower than the observed ones, and vice versa they are higher for the order V>Adv.

Given the binomial nature of our outcome variable, we fitted our data to a binomial logistic regression model to investigate whether the likelihood of the relative order between adverbs and verbs can be predicted based on the adverbial class. The relative order between verb and adverb was posited as our dichotomous dependent variable, while adverbial class was set as the independent variable. The reference categories were ''V>Adv'' for the dependent variable and ''T-Asp'' for the independent one. The logistic regression model is statistically significant, suggesting that the likelihood of the order between V and Adv significantly depends on the adverbial class (AIC 403, R^2_N 0.11, χ^2 29.9, $df = 379$, $p < 0.001$). With the cut-off value set at 0.7 as suggested by the crossing point of the sensitivity and specificity lines, the model correctly classified 75.7 per cent of the cases. Increasing the adverb height is associated with a reduction in the likelihood of exhibiting the V>Adv order, as clearly depicted by the estimates plot in Figure 1. The results are consistent with the prediction drawn within the hierarchical hypothesis.

The data collected on the position of the verb support the idea that the

clause is organised as a hierarchy of functional projections across which the verb can move, thus being in line with the cartographic prediction. Once again, it is difficult to account for the observed patterns assuming a flat clause structure, in which adverbs are organised without hierarchy.

5.3 The position of subject and object DPs

The last argument in support of our claim concerns the order of subject and object DPs with respect to the adverbs. As acknowledged in various works, determining the position of argumental DPs in Ancient Greek is surely a complex task because of a variety of factors. For instance, subject drop is very frequent, and the presence of a direct object depends on the argumental structure of the main verb of the clause; moreover, pro-drop sometimes also occurs for direct objects (see Gaeta & Luraghi 2001; Luraghi 2003; 2010).

Aware of these complications, we further refine our initial corpus of the *Histories*. For this investigation we consider those sentences which also include an overt subject or an overt direct object marked with accusative morphology,[12] in addition to an adverb and a finite verb. Accordingly, the sentences in Thucydides' work meeting these criteria amount to 153 occurrences for the subject and 113 for the object. These sentences form our two restricted corpora for the last argument.

Subject and object DPs can both precede and follow the adverbs just like the verb does (see §5.2). In both the examples in (39), the subject is a plural ethnonym, the adverb is the same, i.e. *ḗdē*, and the direct object follows the verb in both cases. In (39 a) the subject precedes the adverb, whereas in (39 b) it follows it.

(39) (a) *καὶ οἱ Ἀθηναῖοι ἐκράτουν ἤδη τῶν ἐφόδων.*
kaì ***hoi=Athēnaî-oi***
and DET-NOM.M.PL=Athenian-NOM.M.PL
e-krát-oun ***ḗdē*** *t-ôn*
PST-be_master-IND.IPF.3PL already DET-GEN.F.PL
ephód-ōn.
entrance-GEN.F.PL
'And the Athenians had already got possession of the entrances.' [Thuc. 5.67.1]

12 Other obligatory arguments of the verb, such as datives or locatives, are not considered here.

(b) *ἔπειτ᾽ ἤδη Λακεδαιμόνιοι αὐτοὶ ἑξῆς καθίστασαν τοὺς λόχους.*
épeit' ***ēdē*** ***Lakedaimóni-oi*** ***aut-oì***
after_that already Lacedaemonian-NOM.M.PL self-NOM.M.PL
hexês *kat-hísta-san* *t-oùs* *lókh-ous.*
in_a_row PREF-array-IND.IPF.3PL DET-ACC.M.PL troop-ACC.M.PL
'After that, the Lacedaemonians themselves had already ordered their troops, band after band.' [Thuc. 5.67.1]

A similar observation holds when object DPs are considered. In (40) the direct object is always a definite noun phrase (plural in 40 a, singular in 40 b); the adverb is the same, i.e. *ḗdē*, in both cases. The adverb follows the object DP in (40 a) and precedes it in (40 b).

(40) (a) *καὶ διὰ τῶν κατὰ τὴν ἀγορὰν πυλῶν τοὺς λοιποὺς ἤδη τῶν πελταστῶν ἐσεδέχοντο.*
kaì *dià* *t-ôn* *katà* *tḕn* *agorà-n*
and PREP DET-GEN.F.SG PREP DET-ACC.F.SG agora-ACC.F.SG
pul-ôn ***t-oùs*** ***loip-oùs*** ***ḗdē***
gate-GEN.F.PL DET-ACC.M.PL remaining-ACC.M.PL already
t-ôn *peltast-ôn* *es-e-dékh-onto.*
DET-GEN.M.PL targeteer-GEN.M.PL PREF-PST-receive-IND.IPF.3PL
'and received the rest of the targeteers by the gate that led to the market-place.' [Thuc. 4.111.2]

(b) *ὥστε τῇ ἐπιτειχίσει τῆς Δεκελείας προσεῖχον ἤδη τὸν νοῦν.*
hṓs-te *t-êi* *epiteikhís-ei* *t-ês*
COMP-PTCL DET-DAT.F.SG fortifying-DAT.F.SG DET-GEN.F.SG
Dekeleí-as *pros-eîkh-on* ***ḗdē***
Deceleia-GEN.F.SG PREF-PST.have-IND.IPF.3SG already
t-òn ***noûn.***
DET-ACC.M.SG mind.ACC.M.SG
'So they had already set their minds upon the fortifying of Deceleia.' [Thuc. 6.93.2]

We conducted a quantitative analysis to investigate whether the position of the adverb with respect to the argumental DP was different, depending on the type of argumental DP, i.e. subject or object. Again, the hierarchical model and the flat-structure hypothesis make different predictions.

Under a cartographic approach, the pragmatically unmarked position of subject DPs is higher than the position of object DPs. Leaving aside the exact location in the split TP and VP layer, we expect subject DPs to occur higher

than object DPs when no pragmatically driven movements (and more generally A-bar movements) apply. Under a flat-structure hypothesis, the order of constituents is either pragmatically driven, when a pragmatic value is assigned, or unpredictable, when they are pragmatically neutral (see also the X-zone in Dik's (1995) model, reported in (2) in §2).[13] Both models, at least in Rizzi's (1997) and Dik's (1995) versions, assume that pragmatically marked positions are equally accessible to both subjects and objects, and that, when pragmatically displaced, they precede both the verb and the pragmatically neutral material. The two models diverge when it comes to the order between argumental DPs and adverbs, both when the argumental DPs are in their unmarked position as well as when they are displaced. According to the flat-structure hypothesis, pragmatically unmarked TP adverbs occur freely, whereas, according to the cartographic approach, they are ordered in a hierarchical way below the highest landing sites of subject A-movement and above the first-merge position of objects. Therefore, the flat-structure predicts that argumental DPs precede or follow adverbs with no clear difference depending on whether the argumental DP is the subject or the object. Conversely, the cartographic hypothesis predicts that the relative order between argumental DPs and adverbs depends on whether the DP is the subject or the object.

To test these two hypotheses, we calculated how many times the adverbs in (7) occurred before or after the subject DP and how many times they occurred before or after the object DP. The crucial point is that we did not consider the position of DPs with respect to one another or to the verb: hence, no relation to the SOV or SVO nature of Greek syntax is involved. Only adverbs are used as a reference point under the TP node. In order to limit arbitrariness in the selection of the data, we included all the sentences, independently of whether the two DPs have possibly undergone displacement.

Table 4 illustrates the raw number and percentages of the relative orders between adverbs and DPs depending on the type of argument, i.e. subject or object. It shows that subject DPs more frequently precede the adverbs, while object DPs more frequently tend to follow them.

The observation was confirmed by the χ^2 test, evaluating the null hypothesis that the two word orders have the same distribution across the two argumental DPs. The analysis revealed that the frequency of the two word-

13 Under a flat-structure hypothesis, one may assume that pragmatically unmarked sentences have a topic-comment organisation. Under such a proposal, the pragmatically unmarked subject is usually the topic and the object is generally part of the comment (Lambrecht 1994). Accordingly, subject DPs should precede object DPs. If adverbs are part of the comment, this view predicts subjects to precede adverbs. Conversely, the order between objects and adverbs is expected to be free, since they are part of the comment and not hierarchically structured.

Type of DP	Adv > DP	%	DP > Adv	%
subject	56	37	97	63
object	69	61	44	39

Table 4 Frequencies of Adv>DP and DP>Adv and type of DP

orders significantly differs (χ^2 15.6, df 1, $p < .001$). The frequency of the order DP>Adv increases when the DP is the subject and, conversely, the frequency of the order Adv>DP increases when the DP is the object. The expected numbers for the order DP>Adv are lower for the subject DP than the actual numbers, and vice versa the expected numbers for the order Adv>DP for the subject DP are higher than those observed. In contrast, for the object DP, the expected numbers for the DP>Adv order are higher than the actual numbers, while the expected numbers for the Adv>DP order are lower than those observed.

Given the binomial nature of our outcome variable we fitted our data to a binomial logistic regression model with word order (Adv>DP vs. DP>Adv) as the dependent variable and DP-type (subject vs. object) as the independent factor. The reference category was set as ''Adv>DP'' for the dependent variable and ''object'' for the independent factor. The logistic regression model is statistically significant, suggesting that the likelihood of the order between DP and Adv significantly depends on the DP-type factor (AIC 356, R^2_N 0.078, χ^2 15.7, $df = 264$, $p < 0.001$). With the cut-off value set at 0.6 as suggested by the crossing point of the sensitivity and specificity lines, the model correctly classified 71.2 per cent of the cases. Being an object DP is associated with an increase in the likelihood of exhibiting the Adv>DP order, as depicted by the estimated marginal means plotted in Figure 2.

We then performed a more careful analysis on the type of adverbs preceding and following subject and object DPs. As for subject DPs, we found a difference in the type of adverbs that most frequently follow it. T(past) and Mood(irrealis) adverbs were found to equally precede and follow subject DPs: In half of the occurrences (28 items) these adverbs precede the subject and in the other half they follow it. Conversely, T(anterior) and aspectual adverbs follow the subject in the more than 70 per cent of the instances, i.e. in 42 and 27 occurrences respectively. Hence, the relative order between subject DPs and adverbs depends on the adverbial class. Conversely, object DPs tend to follow all adverbs in more than 70 per cent of the occurrences. In about 30

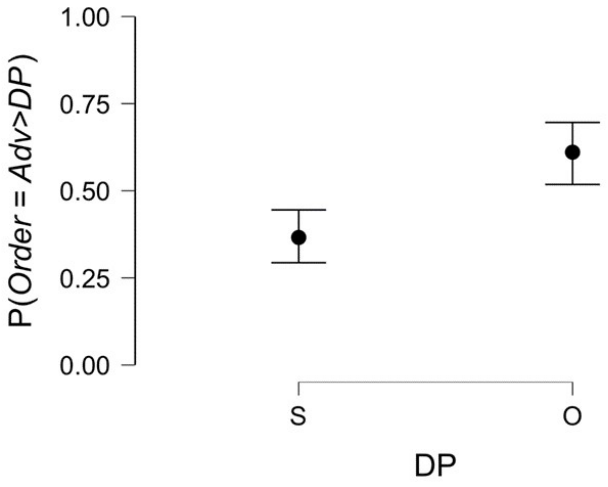

Figure 2 Estimated marginal means: probability of observing the order Adv>DP for subject and object DPs.

per cent of the occurrences we found an object DP preceding an adverb, but this mainly happened with T(anterior) and aspectual adverbs.

This qualitative analysis not only suggests that adverbs tend to follow subject DPs, as may be also expected under a pragmatics-driven approach, but also that the relative order between adverbs and argumental constituents is crucially governed by the type of adverb and the type of constituent, as predicted within the cartographic framework. The difference between the positions of subject and object DPs with respect to different adverb classes can be explained by the fact that subject and object DPs are structurally located in different and ordered positions along the clausal hierarchy and that the adverb classes are arranged along it, which is in line with the cartographic expectations.

5.4 Some final remarks and the split-configurational hypothesis

The data investigated and the discussion so far point towards a hierarchical analysis of at least a portion of the sentence structure in Classical Greek. A summary of the results will clarify the theoretical implications and allow for a comparison with other approaches to the issue of Ancient Greek word order.

The ordering of adverb pairs conforms to the hierarchy which has been proposed as a linguistic universal (Cinque 1999). The constant match between the occurrences of adverb pairs in the corpus and the prediction of the theory shows that a baseline[14] order exists, which can be explained as the result of the base-generation of the adverbs within a hierarchical sentence structure, as assumed in the cartographic framework. The finite verb can occupy different positions with respect to the adverbs, a fact which was interpreted as its possibility to undergo (leftward) movement; however, the movement span is conditioned by the height of the considered adverb in the hierarchy, which means that the underlying structure conditions its position. The same idea is suggested by the different behaviour of subject and object DPs, and by the quality of adverbs that most likely follow or precede them. As a conclusion, it is possible to envisage one and the same structure influencing multiple word order phenomena, with constituent base-generation and movement passing through it.

As for the relation between the structure and the DPs, even if it is true that information structure plays the most important role in word order, as has been acknowledged in the literature within several frameworks (see §2), subject and object also occupy distinct positions as a result of the different grammatical role they have. This idea is also implicitly assumed in works such as Anagnostopoulou & Sevdali (2015), where the syntactic structure is responsible for Case assignment.

As for verb movement, it seems that a head-final structure for both VP and TP (as Windhearn 2021 assumes for Homeric Greek) is not completely satisfying for Classical Greek data. Were those projections regularly head-final, the verb would follow all the adverbs with the same frequency (and possibly precede them if it could move to CP). The assumption of a head-initial TP layer might better suit the data, and is also in line with the change going on at this stage of the Greek language history, as formalised by Taylor (1994).

On a purely speculative level, it is possible to think that the VP is still right-headed in Classical Greek while the TP has already undergone a change towards a left-headed syntax; this way, it is possible to account for the verb-final sentences attested,[15] while giving an appropriate explanation for the observed verb movement. A diachronic change according to which the TP changes its head directionality before the VP is also in line with the so-called ''final-over-final constraint'' (Biberauer, Holmberg & Roberts 2014), which is

14 If not the only one possible; but see Ramchand & Svenonius (2014) and their example (61).

15 Consider also the superficial ambiguity between T-final and V-final structures already noticed by Taylor (1994).

a standard assumption in the present-day generative literature.

Within a non-configurational hypothesis, where no hierarchical sentence structure is present, the data discussed in this article are not easy to formalise, and the tendencies revealed through a quantitative analysis are unexpected. Moreover, since the envisaged structure has already been proposed as a linguistic universal, the conclusion we support is theoretically economical and does not require the development of novel formal tools.

On the other hand, the inadequacy of a split-configurational model, of the type proposed by Goldstein (2016a), is not straightforward.[16] According to Goldstein's proposal, the sentence structure in Classical Greek is divided into two layers: a lower portion, named S, which is returned by merging the verb with its argument in a flat configuration, without any hierarchical VP or TP; and an upper portion, which is equivalent to a configurational CP in hosting an ordered set of left-peripheral elements, such as focused or topicalised constituents, *wh-* items and complementisers. This structure allows one to accommodate two groups of adverbials: high adverbials, which can be adjoined to S or CP and take scope over the sentence, and verb-scope adverbials, which are merged under the S node together with the verb and the event participants (Goldstein 2016a: 215). With reference to the unrefined categories used in Table 3, it is possible to think that Mod(epistemic), T(past) and Mood(irrealis) adverbs adjoin to S or CP, thus occupying a high position in the structure, and that only T-Asp adverbs are merged below S in the non-configurational portion.

If Goldstein's model for the clausal architecture is adopted, it is possible to verify the adequacy of the latter claim using clausal clitics as a diagnostic. According to Goldstein (2016a: 87 ff.), the occurrence of certain particles such as *án* or *ára* offers a way to distinguish the constituents occurring above and below the S node, as those particles only realise features of the clause they belong to, not of the whole sentence. Therefore, if the adverbs at issue can occur on the right of such particles, it means that they belong to the clausal domain as well.

Using the *proximity* tool, we searched the TLG for occurrences, within six words, of the adverbs in (7) after the particles *án* and *ára* in the five Classical authors considered, i.e. in Isocrates, Lysias, Plato, Thucydides and Xenophon. Then, we only accepted sentences in which the verb displayed finite inflection. We disregarded the cases of *án* used as domain widener with a relative pronoun (see Goldstein 2016a: 92 ff.), in the crystallised form *tákh' àn ísōs* 'perhaps' or in crasis with the complementiser *ei* 'if',[17] and the sentences in which

16 We thank an anonymous reviewer for raising this point.

17 The form *án* resulting from the crasis of *ei* and *án* was not distinguished from the simple particle

	án	**ára**
Mod(epistemic)	3	0
T(past)	29	14
Mood(irrealis)	46	0
T-Asp	16	7
Total	94	21

Table 5 Adverbs occurring on the right of *án* and *ára*

an embedded clause divided the adverb and the particle from the verb. The results show that all the adverbs considered can follow the particles *án* and *ára*, and thus belong to the clausal domain in Goldstein's (2016a) model. The figures for each adverb class are reported in Table 5,[18] and instances of the supposed high adverbs after the above-mentioned particles are exemplified in (41).

(41) (a) *ὃ τῇ τε ὑμετέρᾳ πόλει δι᾽ ἐμπειρίαν καὶ ἡμῖν μάλιστ᾽ ἂν ἐκ τοῦ εἰκότος προσείη.*
hò *t-êi=te* *humetér-ai* *pól-ei*
DET.NOM.M.SG DET-DAT.F.SG=and your-DAT.F.SG city-DAT.F.SG
di' *empeirí-an* *kaì* *hēm-în* *málist'* ***àn***
PREP experience-ACC.F.SG and 1PL.DAT most_of_all MOD
ek=t-oû ***eikót-os***
PREP=DET-GEN.N.SG likely-GEN.N.SG
pros-eí-ē.
PREF-be_present.OPT-PRES.3SG
'So ought your city, and ours especially, upon experience in all reason to be.' [Thuc. 4.17.5]

by the parser. However, it could be easily recognised because it occurs at the very beginning of a conditional clause without any element on its left.

18 The category T-Asp also includes occurrences of the adverb *pollákis* (2 with *án* and 6 with *ára*), which in combination with modal particles usually conveys the meaning 'perhaps', instead of 'often'. The occurrences of the adverb *êde* have been sorted between T(past) or T-Asp according to their meaning.

(b) *ἀλλοίως ἄρα νῦν ἡμῖν δοκεῖ ἢ πρότερον ἔδοξεν.*
alloí-ōs ***ára*** ***nûn*** *hēm-în* *dok-eî* *è*
different-ADV **MOD** **now** 1PL.DAT seem-IND.PRES.3SG than
próter-on *é-dox-en.*
before-ADV PST-seem-IND.AOR.3SG
'We now hold a different view from what we held before.'
[Plat. Lysis 212d]

(c) *ἐν ᾗ ἄμεινον ἂν ἴσως βουλεύσαιντο ἢ νῦν βεβούλευνται.*
en=hêi *ámein-on* ***àn*** ***ísōs***
PREP=REL.DAT.F.SG better-ADV MOD perhaps
bouleú-sainto *è* *nûn*
deliberate-OPT.AOR.MID.3PL than now
be-boúleu-ntai.
PF-deliberate-IND.PF.MID.3PL
'in which (battle) they may perhaps plan better than they have now.' [Xen. Cyrop. 3.3.47]

The data suggest that the high adverbs identified in the previous sections should be located below S in Goldstein's (2016a) model, i.e. within the clausal domain. This is an expected conclusion also because the characterisation of high adverbs as ''sentence adverbials, frame/domain adverbials, and event-external adverbials'' (Goldstein 2016a: 106–107, building on Frey 2003; see also the examples given there) does not straightforwardly match all the adverbs considered here.

Therefore, even if a split-configurational model comes closer to our data than a non-configurational one, there is still need to postulate hierarchical structures below the S node, i.e. within the clausal domain, to account for the syntactic behaviour of tense and modal adverbs. This theoretical move is in fact equivalent to postulating the existence of a hierarchical TP layer under the CP.

The phenomena considered by Goldstein (2016a: 20 ff.) in favour of a flat-structure hypothesis are instead related to superiority effects in multiple-constituent questions and to reflexive binding. As his data mostly come from Classical Attic authors, they are meaningful to our topic. One can think that the type of phenomena which support Goldstein's claim are actually due to VP-related facts, and may at most suggest the absence of a hierarchical VP layer. As a consequence, Classical Greek would only be non-configurational in the deepest part of the clause structure, showing hierarchical structures from the VP edge up. We leave this point open for future research, as the

focus of this work was the existence of a hierarchical TP layer.[19]

6 Conclusions

This paper investigated whether the clausal portion in Ancient Greek below CP is hierarchically ordered, or rather exhibits a flat structure as proposed in various works, such as Goldstein (2016a) and more generally Luraghi (2010), Hewson & Bubenik (2006), Ponti & Luraghi (2018). We demonstrated that the relative order between adverbs, the relative order between adverbs and finite verbs, and the relative order between adverbs and argumental DPs are not random, but follow a hierarchy which is consistent with the one proposed in Cinque (1999). More precisely, for the three phenomena considered, one and the same functional hierarchy applies. In a cartographic perspective, such a hierarchy determines the order of functional heads (verbal morphemes[20]) and their specifiers (adverbs and arguments), and also constitutes the clause structure within which the verb moves. A flat-structure hypothesis cannot account for the phenomena we discussed, since it is specifically devised to allow for freedom in word order. Even if one conjectured a specific rule for the order of adverbs, it would be hard to account for all the three phenomena together and within a single explanation. The cartographic hypothesis does precisely this, thereby appearing to be a desirable explanation for the data from a theoretical point of view. We conclude that the clausal portion below the CP, more precisely the TP, encodes functional relations among constituents, and is organised in a hierarchical way in Ancient Greek, at least in Thucydides, and plausibly in Isocrates, Lysias, Plato, and Xenophon.

Although our results are mainly based on the *Histories* by Thucydides, and should be verified with a larger dataset, this study suggests that a cartographic approach to Ancient Greek syntax is suitable, and can capture the word order patterns accurately. In addition, it shows that the use of adverbs as diagnostics to determine the order of other elements still proves to be an effective tool.

19 Notice, however, that the validity of Goldstein's tests has already been called into doubt by some scholars. Interrogative clauses violating superiority effects, which also occur in English with D-linked *wh-* phrases, have a syntactic derivation and a semantic import different from interrogative clauses obeying superiority (Bošković 1998; Pesetsky 2000; Beck 2006; Cable 2007, 2010; Kotek 2014). As for reflexive binding, reconstruction effects (see Büring 2005 i.a.) might also play a role, along with specific properties of the reflexive pronouns (in Italian, for instance, the forms *sé* and *sé stesso* behave differently).

20 A correspondence between the order of the adverbs and the functional morphemes on the verbal head is also expected. On Classical Greek morphology and its structure, see Reed (2014) and Grestenberger (2021) in particular.

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