Word Order Flexibility and Adjacency Preferences: 
Competing Forces and Tension in the Greek VP

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Abstract
The present paper aims at further investigating the relative degree of flexibility of constituent order in Greek, which has been classified as a free word order language (Tzartzanos 1946, 1963; Greenberg 1963; Philippaki-Warburton 1982, 1985, 1987; Lascaratou 1984, 1989, 1994, among others). In this study we present additional evidence in support of the view expressed in Lascaratou (1989, 1994, 1999) that, though very flexible, Greek word order is not completely free, but rather it is the result of tension between competing forces determining linear arrangements. Focusing on the analysis of various VP structures drawn from the Hellenic National Corpus (HNC)™, we observe that no single (syntactic and/or lexical/semantic) factor appears to override the others in a salient manner, the relative strength of each individual factor not always being clearly and reliably measurable. In particular, it seems that constituent length does not constitute a more important factor than the syntactic and/or lexical/semantic relations holding between elements in the Greek VP. What is more, with respect to the concept of “adjacency” put forward by Hawkins (2001, 2004) to interpret the preference for certain linearization patterns vs. others, we propose that constituent length essentially operates in a substantially different way and direction than syntactic and/or lexical/semantic dependency relations. More specifically, while—for parsing efficiency— constituent length may often be responsible for the postposition of heavy constituents thus resulting in the disruption of adjacency by separating elements which “belong together”, syntactic and/or lexical/semantic relations, on the other hand, intrinsically motivate the adjacency of elements which “belong together”, thus resisting any rearrangement that would bring them apart.

Keywords
word order; adjacency; Greek VP; domain minimization; processing

1. Introduction
In this paper, drawing on the insights about the special affinity between the Verb (V) and its Direct Object (DO) expressed in Georgiafentis and Lascaratou’s (2003, 2007) formal account of Greek ditransitive structures, which were shown to essentially match Lascaratou’s (1994) performance-motivated analysis of the strong preference of the DO to be linearized immediately after the V in Greek
ditransitive constructions, we shall focus on various other structures involving a V followed by two constituents (NP—PP or PP₁—PP₂). Our hypothesis is that linearization patterns are the result of “tension” between competing factors and that constituent length ((syntactic) “weight” in Hawkins’s (1990, 1991, 1994, 2000, 2001, 2004) terminology) does not easily override syntactic and/or lexical/semantic ones as these seem to establish stronger bonds between elements that “belong together”. The suggestion essentially put forward is that syntactic and/or lexical/semantic relations holding between adjacent constituents underlie the resistance to the effect of constituent length. In other words, we hypothesize that the syntactically and/or lexically/semantically prompted adjacent positions of constituents are not easily “abandoned” when constituent length differences are small. Hence, particular linearization patterns emerge which do not automatically lend themselves to being reversed in response to minimal constituent length differences.¹ The cases examined in this paper represent a few instantiations of the syntactic and/or lexical/semantic relations which hold between elements belonging together; thus, we focus on (a) the V and an NP-complement, (b) the V and a PP-complement, and (c) the V and a lexically dependent PP in the Greek VP.

In formulating our hypothesis we are drawing on Lascaratou’s (1994) claim that in a free word order language such as Greek, the absence of a systematic immediate reaction to syntactic weight indicates that there are other equally significant forces determining linear arrangements. The concept of “adjacency” as put forward by Hawkins (2001, 2004), in his attempt to interpret the preference for certain linearization patterns vs. others, will provide us with the necessary theoretical construct to test our hypothesis.

The paper is organized as follows: In Section 2 Hawkins’s (2001, 2004) theoretical framework is first outlined and then our own competing hypothesis, which claims to provide a more insightful account, is introduced. This presentation of the theoretical underpinnings of our account will set the stage for the subsequent discussion of our findings. In Section 3 we describe the collection of our data, while in Section 4 we present and discuss our findings. Finally, there is a concluding section (Section 5) rounding up the discussion.

¹) As the main goal of this paper is to investigate the effect of syntactic and/or lexical/semantic relations vs. constituent length in determining word order, it was deemed irrelevant to also address the role of Information Structure.
2. Theoretical Considerations

2.1. Hawkins's Proposed Account and Related Concepts

In his original Early Immediate Constituents (EIC) theory, Hawkins (1990, 1991, 1994) argued for the primacy of syntactic weight as a linearization factor. In his more recent account of word order, the most crucial modification that he has made is the introduction of an additional concept, namely that of “adjacency”, to interpret the preference for certain linearization patterns vs. others. In particular, in Hawkins’s (2001, 2004) understanding, adjacency is defined as follows:

**Adjacency to Heads**

Given a phrase \{H, \{X, Y\}\}, H a head category and X and Y phrases that are potentially adjacent to H, then the more combinatorial and dependency relations whose processing domains can be minimized when X is adjacent to H, and the greater the minimization difference between adjacent X and adjacent Y in each domain, the more H and X will be adjacent.\(^2\)

(Hawkins 2004: 103)

It follows that phrasal combinations (i.e. syntactic relations) as well as dependencies (i.e. lexical/semantic relations) underlie adjacency as Hawkins defines it. In his own words (2001: 2), “The preferences for adjacency appear to reflect the number of syntactic and semantic relations that hold between two categories, and the speed and efficiency with which each such relation can be processed in an adjacent order versus a non-adjacent one.”\(^3\) To assess minimization preferences for adjacency, Hawkins distinguishes between two processing domains, namely PCD (Phrasal Combination Domain) and LD (Lexical

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\(^2\) See also Hawkins (2001: 15) for a similar version of this definition. However, it should be noted that Hawkins (2001: 1) originally refers to adjacency as “a fundamental relation in syntax”. Yet in this initial account he does not define adjacency in strict syntactic terms, but rather in terms of (performance) linearization patterns/preferences. That is, such a close syntactic relation as sisterhood is not explicitly and/or exclusively used as an adjacency condition but it is implicitly invoked when he refers to degrees of adjacency between heads and their subcategorized complements, restrictive adjuncts and appositive adjuncts. Thus, though adjacency is not defined by Hawkins as depending on sisterhood, sisterhood relations are ranked as the highest on the adjacency scale. Moreover, adjacency is also applied to refer to co-occurring heads and adjuncts. Hence, adjacency is treated by Hawkins as a gradient notion (relative degrees of adjacency) between a head:

- a subcategorized complement > and a restrictive adjunct > and an appositive adjunct.

Therefore, in Hawkins’s account adjacency implicitly combines both underlying syntactic relations and surface linearization.

\(^3\) It is worth pointing out that the phrasing of this hypothesis allows Hawkins not to commit himself as to the relative strength of EIC (see note 4) and lexical-semantic dependency.
Domain), for phrasal combinations and dependencies, respectively. These domains, subsumed under MiD (presented below), are defined as follows:

**Phrasal Combination Domain** (PCD)

The PCD for a mother node M and its I(mmediate) C(onstituent)s consists of the smallest string of terminal elements (plus all M-dominated non-terminals over the terminals) on the basis of which the processor can construct M and its ICs.\(^4\) (Hawkins 2004: 107)

**Lexical Domain** (LD)

The LD for assignment of a lexically listed property P to a lexical item L consists of the smallest possible string of terminal elements (plus their associated syntactic and semantic properties) on the basis of which the processor can assign P to L. (Hawkins 2004: 117)

From the above, it follows that domain minimization is a fundamental aspect of Hawkins’s proposed concept of adjacency, i.e. it is assumed that the preference for minimizing (syntactic/semantic) processing domains is the factor determining adjacency.

**Minimize Domains** (MiD)

The human processor prefers to minimize the connected sequences of linguistic forms and their conventionally associated syntactic and semantic properties in which relations of combination and/or dependency are processed. The degree of this preference is proportional to the number of relations whose domains can be minimized in competing sequences or structures, and to the extent of the minimization difference in each domain.\(^5\) (Hawkins 2004: 103)

\(^4\) PCD is a relabeling of Hawkins’s (2001: 5) Constituent Recognition Domain (CRD), generalized so as to be compatible with both production and comprehension. Moreover, according to Hawkins (2004: 107), the “short before long” preference within a Phrasal Combination Domain (PCD) is expressed in terms of the following syntactic principle:

**Early Immediate Constituents** (EIC)

The human processor prefers linear orders that minimize PCDs (by maximizing their IC-to-non-IC [or IC-to-word] ratios), in proportion to the minimization difference between competing orders. (See also Hawkins (2001: 5) for an earlier version of this principle.)

It is worth noting that both the earlier concept of CRD and its corresponding more recent version PCD, on the one hand, and the (2001) and (2004) versions of EIC, on the other, are phrased in loose syntactic terms. More specifically, though such formal terms as “mother node” and “ICs” are used, the phrasing seems to ignore the concept of binary branching adopted within X-bar syntax, given that in Hawkins’s account the term “ICs” is not strictly used to identify constituents in a sisterhood relation to an X\(^0\) head. Therefore, Hawkins’s proposed concepts are assumed to comprise not only sisters to a head X\(^0\) (complements) but also sisters to an X’ (adjuncts). This, in fact, becomes clear in his discussion of PCDs where complements and adjuncts are contrasted and their different linearization patterns (complement—adjunct vs. adjunct—complement) are examined in relation to the constituent length factor.

\(^5\) Note that this is actually a generalized version of Hawkins’s (2001: 9) Minimize Domains
Simultaneous processing and working memory load are minimized in domains of minimal length. Hence, the main idea underlying the principle above is that speakers/hearers prefer to produce and recognize, i.e. process, linguistic forms in (phrasal combination and/or lexical) domains of minimal length but only in proportion to the minimization gained against a competing alternative structure. It is, therefore, this preference that essentially motivates adjacency effects. Thus, for example, the theory predicts (a) that the syntactic phrases listed among the co-occurrence requirements for a head verb in its subcategorization frame will prefer adjacency to that head and (b) that the lexically sensitive theta-roles assigned to NPs by a given verb will prefer adjacency between these NPs and V.

Most importantly, in terms of his proposed MiD principle, Hawkins appears to aim at accounting for the differential pressure towards adjacency exerted by syntactic and lexical/semantic properties as opposed to constituent length, i.e. the preference for linearizing short before long constituents. According to Hawkins (2004), the existence of multiple domains (i.e. PCDs and LDs) and their related preferences for the processing of syntactic and semantic properties requires a metric that can assess their combined effect within a given structure. For this purpose, the Total Domain Differential (TDD) metric is put forward:

*Total Domain Differential (TDD)*

The TDD is the collective minimization difference between two competing sequences measured in words and calculated on the basis of the phrasal combination domains, lexical domains, or other domains required for the processing of syntactic or semantic relations within these sequences. (Hawkins 2004: 120)

Given a phrase \{H, \{X, Y\}\}, predictions are made for the relative strength of the syntactic (phrasal combination) and the lexical factor, by measuring their respective domain minimizations in terms of number of words within each competing sequence, i.e. [H X Y] and [H Y X]. Thus, on the basis of the TDD, whichever of these two structural variants is assessed as having the highest overall minimization will be more efficient and should be the one selected.

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principle, now compatible with both production and comprehension, i.e. reflecting a preference of the human processor. It is noteworthy that, in essence, the concept of domain minimization is originally initiated by means of Hawkins's (2001, 2004) EIC principle where, however, the concept of domain is initially restricted to domains defined by Hawkins in syntactic terms (i.e. such terms as “mother node” and “ICs”). Yet, with the introduction of his MiD principle (2001, 2004), domain minimization is crucially expanded: not only does MiD include sequences of linguistic forms that are in a syntactic relation of phrasal combination but also sequences of linguistic forms in a lexical/semantic relation of dependency.
At this point, however, a comment is in order with respect to Hawkins's account: Once more, constituent length (EIC) is essentially invoked by Hawkins as the determining factor in the ordering of constituents within a phrase. This time, though, it is introduced—in an indirect and subtle way—as an underlying force rather than as a salient one. More specifically, it serves as the common background against which domain minimizations are compared for the assessment of the relative strength of phrasal combinations and dependencies:

**TDD Performance Prediction**

Sequences with the highest collective minimization differences will be those that are preferably selected, in proportion to their relative TDDs. (Hawkins 2004: 120)

As we show in more detail in the discussion of our findings, a thorough examination of the individual cases included under Hawkins's TDD Performance Prediction reveals that the TDD metric is basically proposed to justify the existence of EIC counterexamples. These are linearization patterns disconfirming the primary effect of constituent length when EIC and lexical-semantic relations are competing. In other words, such are the cases where, given a longer lexically dependent phrase and a shorter independent one, the former is not postposed but prefers to be adjacent to the Head. Thus, to defend the “primacy” of constituent length, Hawkins now avoids assessing it as an independently functioning factor and tries to calculate its combined effect by attributing the occurrence of EIC dispreferred sequences to the overall minimization difference between competing orders.

### 2.2. Our Proposed Account

Lascaratou (1994) has shown that performance data from a free word order language such as Greek do not reveal the immediate reaction to syntactic weight (i.e. constituent length measured in number of words, see, FIPROC Hypothesis—Lascaratou 1984, 1989, 1994; EIC Principle—Hawkins 1990, 1991, 1994, 2000, 2001, 2004) predicted by Hawkins’s (1990, 1991, 1994) original EIC theory for free order variants; that is, she has argued that structures are not promptly rearranged so as to postpone “heavy” constituents if these differ from “lighter” ones only minimally in size. According to her, the observation that the “short before long” linearization principle is not invariably adhered to when constituent length differences are small (one or two words) reveals some resistance to the syntactic weight factor and indicates, therefore, that other competing forces are at play. On the basis of this observation, she has argued that, though very flexible, Greek order is neither completely free nor arbitrary, but rather it is the result of the “compromise” between conflicting (syntactic and/or pragmatic)
forces operating in opposite directions. What is more, Lascaratou (1989, 1994, 1999) has observed that only a restricted number of the theoretically potential free order variants in different Greek sentence types is actually attested in performance data.

Drawing on Lascaratou's insights about the degree of flexibility of Greek word order and the forces at play, the account proposed in the present paper involves a refinement of the concept of adjacency as put forward by Hawkins (2001, 2004). In particular, our hypothesis is that syntactic and/or lexical/semantic relations intrinsically motivate the adjacency of elements which “belong together”, thus resisting any rearrangement that would bring the related elements apart; on the other hand, for parsing efficiency, constituent length may often be responsible for the postposition of heavy constituents thus resulting in the disruption of adjacency by separating elements which “belong together”. In addition, we hypothesize that the syntactically and/or lexically/semantically prompted adjacent positions of constituents are not easily “abandoned” when constituent length differences are small. Hence, particular linearization patterns emerge which do not automatically lend themselves to being reversed in response to minimal constituent length differences. It follows from the above that linearization patterns are the result of “tension” between competing factors and that constituent length does not easily override syntactic and/or lexical/semantic ones as these seem to establish stronger bonds between elements that “belong together”.

It is worth pointing out that our interpretation of the operation of constituent length and syntactic and/or lexical/semantic dependency relations as linearization factors is quite different from Hawkins’s proposal: We claim that constituent length essentially operates in a substantially different way and direction from syntactic and/or lexical/semantic dependency relations, despite the fact that it “surfaces” in a similar way. More specifically, constituent length is a force pushing to a later position whichever IC (XP or YP) is heavier in a structure, so as to facilitate parsing (in terms of processing efficiency and rapidity). As a result, lighter/shorter ICs are arranged before heavier/longer ones, thus, for example, the V and a short NP/PP are placed in adjacent positions. In the case of syntactic and/or lexical/semantic dependency relations (that is, lexically listed combinations and dependencies which are laid down in the lexical co-occurrence frame of the head), adjacency is not a consequence but rather the linearization factor itself, as a Head H and a syntactically and/or lexically/semantically dependent XP, e.g. a V and an NP/PP, “belong together conceptually” and, hence, are placed together. In the present paper we examine a number of cases which represent instantiations of these syntactic and/or lexical/semantic relations. In particular, we focus on the relations which hold between elements in the Greek VP, namely between (a) the V and an
NP-complement, (b) the V and a PP-complement, and (c) the V and a lexically dependent PP.

3. Collection of Data

Our data have been collected from the Hellenic National Corpus (HNC)™ developed by the Institute for Language and Speech Processing (ILSP). HNC currently contains more than 50,000,000 words of written texts. Users can retrieve parts of these texts in the form of whole sentences by making queries based on one to three words, lemmas or parts of speech. Furthermore, users can define the maximum distance between search items as well as the specific sub-corpus they wish to make queries in.

The current study focused on structures involving a V followed by two constituents: XP and YP (i.e. [NP PP] or [PP1 PP2]). In particular, we looked for the following types of structures and searched the corpus for concordances of specific verb forms in each structure type as follows:

Type 1: [V NP_complement PP_complement] vs. [V PP_complement NP_complement]

where PP is a complement of V but not an IO.

stelni  
send-PRES-3SGsend-PAST-3SG6
vazi  
evale
put-PRES-3SGput-PAST-3SG
ferni  
efere
bring-PRES-3SGbring-PAST-3SG

(1) a. estile [NP iðikus epistimones] [PP sto meefitirio]  
send-PAST-3SGspecial scientists-ACC to-the maternity unit-ACC

‘He/she sent special scientists to the maternity unit.’

b. efere [PP sta tamia tu italiku kratus] [NP 7,6 ðis evro]  
bring-PAST-3SGto-the tills-ACC the Italian state-gen 7.6 billion euro-ACC

‘It brought 7.6 billion euro to the public purse of the Italian state.’

Type 2: [V PP_complement PP_adjunct] vs. [V PP_adjunct PP_complement]

ftani  
eftase
reach/arrive-PRES-3SGreach/arrive-PAST-3SG
beni  
bike
enter-PRES-3SGenter-PAST-3SG
fevji  
efi je
leave-PRES-3SGleave-PAST-3SG

6) PAST means perfective past unless indicated otherwise.
(2) a. o ivan ftani \[PPc\] sti nea tu patriða \[PPa\] tin elαða \\
the Ivan-NOM arrive-pres-3sg at-the new his country-acc the Greece-acc \\
with company-acc a dog-acc the prince-acc \\
‘Ivan arrives at his new homeland, Greece, accompanied by a dog called Prince.’

b. me to ptixio sta xerja fevji \[PPc\] ja dio xronjα \\
with the degree-acc in-the hands-acc leave-pres-3sg for two years-acc \\
for the Samarkand-acc \\
‘With his degree in his hands, he leaves for Samarkand for two years.’

Type 3: [V PP1 PP2] vs [V PP2 PP1] where there is lexical dependency\( ^7 \) between V and PP1.

ipolojizi  ipolojise 
peθeni  peθane 
die-PRES-3SG  die-PAST-3SG 
arosteni  arostise 
fall-ill-PRES-3SG  fall-ill-PAST-3SG

(3) a. i aek ipolojizi \[PP1\] sta lefta tis metaɣrafis kasapi\[PP2\] 
the AEK-NOM count-PRES-3SG on-the money-acc the transfer-gen Kasapi-gen 
for the acquisition-acc new football players-acc \\
‘AEK counts on the money of Kasapis’s transfer for the acquisition of new football players.’

b. peθane \[PP2\] se ilikia 54 eton \[PP1\] apo karkino 
die-PAST-3SG at age-acc 54 years-gen from cancer-acc \\
‘He/she died of cancer at the age of 54.’

Type 4: [V PP1 PP2] vs [V PP2 PP1] where there is lexical matching/range reduction\( ^8 \) between V and PP1.

kaθete  ekatse  kaθise 
sit-PRES-3SG  sit-PAST-3SG  sit-PAST-3SG

\( ^7 \) According to Hawkins (2001, 2004), in cases where there is lexical dependency between a V and a PP the meaning or grammar of one of those categories requires access to the other for its assignment, e.g. ‘count on John’ vs. ‘count’. What is more, the meaning is different in the presence of PPlex.

\( ^8 \) According to Hawkins (2001, 2004), these are cases involving PPs whose semantic content gives further specification to or reduces the range of the semantic content of the verb, e.g. ‘sit in the armchair’ (lexically matching PP) vs. ‘sit in the afternoon’ (no matching).
(4) a. to 48.9% kaθete [PP1 sto spiti] [PP2 me filous]
   the 48.9% sit-PRES-3SG at-the house-ACC with friends-ACC
   'A 48.9% stays at home with friends.'

b. ekini kaθete [PP2 me ton volondia] [PP1 se ena pangaki]
   she sit-PRES-3SG with the Volondia-ACC on a bench-ACC
   'She is sitting on a bench with Volondia.'

Type 5: [V PP1 PP2] vs. [V PP2 PP1]
where PP1 and PP2 are more loosely related to V (adjuncts), i.e. there is no combination
(frame) or dependency or matching relations.

troi efaje
eat-PRES-3SG eat-PAST-3SG
trexí etrekse
run-PRES-3SG run-PAST-3SG
milai miluse milise
talk/speak-PRES-3SG talk/speak-PAST-IMPRF-3SG talk/speak-PAST-3SG
majirevi majirepse
cook-PRES-3SG cook-PAST-3SG

(5) a. milai [PP1 me paθos] [PP2 ja tin anangi tis na erotefti
   talk-PRES-3SG with passion-ACC for the need-ACC her sbjn.particl fall-in-love
   aliθina]
   truly
   'She talks passionately about her need to fall truly in love.'

b. miluse [PP2 ja tin aðikia pu tis ejine]
   talk-PAST-IMPRF-3SG for the injustice-ACC that her-cl become-PAST-3SG
   [PP1 me aksioprepía]
   with dignity-ACC
   'She was talking with dignity about the injustice she had suffered.'

In Type 1, 2, 3 and 5 we set the total number of sentences at 100 per word form, i.e. 100 × 6 word forms = 600 sentences per type, while in Type 4 the total number of sentences was set at 500.

As the concordances we found in Type 3 and Type 5 were extremely few, we decided to analyze and discuss only Type 1, 2 and 4, where a sufficient number of examples was attested.

4. Our Findings and Discussion

4.1. Observed XP vs. YP Sizes by (Basic/Typical vs. Reverse) Order

The following tables summarize the distribution of asymmetries in Type 1 (NP vs. PP), Type 2 (PP complement vs. PP adjunct), and Type 4 (PP lex vs. PP) concordances by order that were observed in our data:
### Table 1. Distribution of NP vs. PP asymmetries in Type 1 concordances by order

<table>
<thead>
<tr>
<th>Order</th>
<th>NP &lt; PP</th>
<th>NP = PP</th>
<th>NP &gt; PP by 1 word</th>
<th>NP &gt; PP by 2+ words</th>
<th>Row total</th>
<th>Grand total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>NP PP</td>
<td>32</td>
<td>17</td>
<td>6</td>
<td>4</td>
<td>59</td>
<td>78.67</td>
</tr>
<tr>
<td>(basic)</td>
<td>54.24</td>
<td>28.81</td>
<td>10.17</td>
<td>6.78</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>PP NP</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>12</td>
<td>16</td>
<td>21.33</td>
</tr>
<tr>
<td>(reverse)</td>
<td>12.5</td>
<td>12.5</td>
<td>0.00</td>
<td>75.00</td>
<td>100.0</td>
<td></td>
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<tr>
<td>Column total</td>
<td>34</td>
<td>19</td>
<td>6</td>
<td>16</td>
<td>75</td>
<td>100.0</td>
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</table>

### Table 2. Distribution of PP_complement vs. PP_adjunct asymmetries in Type 2 concordances by order

<table>
<thead>
<tr>
<th>Order</th>
<th>PP_c &lt; PP_a</th>
<th>PP_c = PP_a</th>
<th>PP_c &gt; PP_a by 1 word</th>
<th>PP_c &gt; PP_a by 2+ words</th>
<th>Row total</th>
<th>Grand total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>PP_c PP_a</td>
<td>25</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>33</td>
<td>76.74</td>
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<tr>
<td>(basic)</td>
<td>75.76</td>
<td>12.12</td>
<td>3.03</td>
<td>9.09</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>PP_a PP_c</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>5</td>
<td>10</td>
<td>23.26</td>
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<td>20.00</td>
<td>30.00</td>
<td>0.00</td>
<td>50.00</td>
<td>100.0</td>
<td></td>
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<tr>
<td>Column total</td>
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<td>1</td>
<td>8</td>
<td>43</td>
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### Table 3. Distribution of PP_lex vs. PP asymmetries in Type 4 concordances by order

<table>
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<tr>
<th>Order</th>
<th>PP_lex &lt; PP</th>
<th>PP_lex = PP</th>
<th>PP_lex &gt; PP by 1 word</th>
<th>PP_lex &gt; PP by 2+ words</th>
<th>Row total</th>
<th>Grand total %</th>
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<tbody>
<tr>
<td>PP_lex PP</td>
<td>19</td>
<td>7</td>
<td>3</td>
<td>1</td>
<td>30</td>
<td>90.91</td>
</tr>
<tr>
<td>(basic)</td>
<td>63.34</td>
<td>23.33</td>
<td>10.00</td>
<td>3.33</td>
<td>100.0</td>
<td></td>
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<tr>
<td>PP_PP_lex</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
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<td>33.33</td>
<td>66.67</td>
<td>0.00</td>
<td>0.00</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Column total</td>
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<td>9</td>
<td>3</td>
<td>1</td>
<td>33</td>
<td>100.0</td>
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</tbody>
</table>
Let us examine what our findings reveal about the operation of linearization factors by exploring how the frequencies of basic/typical vs. reverse orders compare across all three concordance types as regards the relative size of XP vs. YP, namely in the following cases: (a) when XP and YP are equal in size, (b) when XP is smaller in size than YP, and (c) when XP is larger in size than YP.

4.1.1. XP and YP Are Equal in Size (XP = YP)

Across all Types of concordances (1, 2, 4), the observed cases where XP and YP are equal in size are 35 out of a total of 151 constructions, i.e. 23.18%. More specifically:

Type 1 (Table 1): 19 out of 75 (25.33%)
Type 2 (Table 2): 7 out of 43 (16.28%)
Type 4 (Table 3): 9 out of 33 (27.27%)
TOTAL: 35 out of 151 (23.18%)

These are cases where the syntactic weight factor is clearly not at play. Thus, the only “force” that could be claimed to be operating is the syntactic and/or lexical/semantic relation holding between the H(ead) and a constituent XP if these two constituents are adjacent, namely in the basic/typical orders. Consider the following examples, all of which are in the basic/typical order:

(6) vazi [NP:ta pedja tu] [PP:se ena konteiner] (Type 1)
put-PRES-3SG the children-ACC his in a container-ACC
'He puts his children into a container.'

(7) efije [PPc:apo to spiti] [PPa:sta 15 tu] (Type 2)
leave-PAST-3SG from the house-ACC at-the 15-ACC his
'He left home at the age of 15.'

(8) kaθete [PPlex:s’ ena trapezi] [PP:me enan dimosiɔγrafo] (Type 4)
sit-PRES-3SG at a table-ACC with a journalist-ACC
'She is sitting at a table with a journalist.'

Comparing the relative frequencies of basic/typical vs. reverse orders when XP and YP are equal in size could give us an indication of the strength of the operation of the syntactic and/or lexical/semantic relation holding between the H(ead) and XP. In other words, if the syntactic and/or lexical/semantic relations did not favour adjacency, then we would expect a more or less equal distribution of the basic/typical vs. reverse orders. However, as the figures in Table 4 illustrate, this is not the case.
In total, of the 35 observed cases where XP = YP\textsuperscript{9} in size, as many as 28 (i.e. 80.00\%) are realized in the basic/typical orders (namely, 17 cases of Type 1, 4 cases of Type 2, and 7 cases of Type 4), while only 7 (i.e. 20.00\%) are realized as the reverse orders (namely, 2 cases of Type 1, 3 cases of Type 2, and 2 cases of Type 4). Thus, in 4/5 of the data with equal XP and YP size, the head H and the syntactically and/or lexically/semantically related constituent XP are adjacent, which indicates that it is the relation involved which prompts and maintains adjacency. Therefore, these data constitute evidence of the effect of forces other than constituent length, a fact that lends support to our hypothesis.

### 4.1.2. XP Is Smaller in Size than YP (XP < YP)

Moving on to those cases where XP is smaller in size than YP across all Types of concordances (1, 2, 4), we find as many as 81 such constructions out of a total of 151, i.e. 53.64\%. In particular:

- **Type 1 (Table 1):** 34 out of 75 (45.34\%)
- **Type 2 (Table 2):** 27 out of 43 (62.79\%)
- **Type 4 (Table 3):** 20 out of 33 (60.61\%)

**TOTAL:** 81 out of 151 (53.64\%)

These figures show that, overall, when XP and YP are not equal in size, the XP is considerably more frequently shorter (53.64\% of all data) (rather than longer) than YP. (See below the relevant frequencies of XP > YP cases, showing that in only 16.56\% of the observed data is the XP longer than YP).\textsuperscript{10}

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\textsuperscript{9} The 10 cases where XP > YP by only 1 word (all basic orders) could be viewed as essentially belonging to the XP = YP category, as the length difference is minimal and light. Given their marginal length difference, it was decided not to include them under either XP > YP or XP = YP. Therefore, the cases exhibiting clear asymmetries are 106 in total, i.e. 151 - 45 cases (namely, 35 cases where XP = YP, plus 10 where XP > YP by only 1 word).

\textsuperscript{10} If the differences in size are computed against the total of 106 cases where there is clear asymmetry between XP and YP, then the percentages are even more striking, i.e. 76.4\% for XP < YP and 23.6\% for XP > YP by 2+ words.
A comparison between the relative frequencies of orders when the XP < YP asymmetry is observed (Table 5) shows an overwhelmingly higher frequency of basic/typical vs. reverse orders, namely 93.83% and 6.17%, respectively. These prevalent (basic/typical) orders are the cases where both (i) the syntactic and/or lexical/semantic relation holding between the head H and XP and (ii) syntactic weight operate in the same direction and, consequently, their relative effect cannot be measured, i.e. the effect of each individual factor cannot be assessed separately. On the other hand, the reverse orders are counterexamples of all linearization factors under discussion and hence cannot shed any light on their operation either.

Table 5. Basic/typical vs. reverse order when XP < YP

<table>
<thead>
<tr>
<th>Type</th>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic/typical order</td>
<td>32</td>
<td>25</td>
<td>19</td>
<td>76 (93.83%)</td>
</tr>
<tr>
<td>Reverse order</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>5 (6.17%)</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>27</td>
<td>20</td>
<td>81 (100.00%)</td>
</tr>
</tbody>
</table>

Consider the following data, exemplifying basic/typical orders with XP < YP asymmetry:

(9) estile [NP vioγrafiko] [PP sto tileoptiko sou tis karol bernet] (Type 1)
    send-past-3sg CV-acc to-the TV show-ACC the Carol Burnett-gen
    'He sent his CV to the Carol Burnett TV show.'

(10) o tsaki bike [PPc s’ ena bar] [PPa me δjakosja δolaria stin tsepi] (Type 2)
     the Chaki-nom enter-past-3sg in a bar-ACC with two hundred dollars-ACC
     in-the pocket-ACC
     'Chaki entered a bar with two hundred dollars in his pocket.'

(11) o oðiɣos kaθete [PPlex piso apo to timoni] [PPlex me orθanixta matja ke tendomena xerja] (Type 4)
     the driver-nom sit-pres-3sg behind the steering-wheel-ACC
     with wide open eyes-ACC and stretched arms-ACC
     'The driver is sitting behind the steering-wheel with wide open eyes and stretched arms.'

4.1.3. XP Is Larger in Size than YP (XP > YP)

As regards the XP > YP asymmetry, across all Types of concordances (1, 2, 4) the observed cases where XP is larger in size than YP (by 2+ words) are only 25 out of a total of 151, i.e. 16.56%:
Type 1 (Table 1): 16 out of 75 (21.33 %)
Type 2 (Table 2): 8 out of 43 (18.60 %)
Type 4 (Table 3): 1 out of 33 (3.03 %)
TOTAL: 25 out of 151 (16.56 %)

In those cases where XP is larger in size than YP, the two processing operations/factors are assumed to compete, i.e. to operate in opposite directions, since the syntactic and/or lexical co-occurrence relation holding between the H(ead) and the XP would favour H XP adjacency—thus resulting in basic/typical orders—whereas constituent length is expected to push the lengthier XP to a position after the independent YP—thus prompting reverse orders. These are, in Hawkins’s words, the interesting cases as they lend themselves to the measurement of the competing forces.

If we compare the relative frequencies of our observed orders in the case of XP > YP asymmetry, the figures (Table 6) show an overwhelmingly higher frequency of reverse vs. basic/typical orders, namely 68.00 % (17 cases) and 32.00 % (8 cases), respectively. In our findings, therefore, it is constituent length (EIC) which “wins” in the majority of cases where XP > YP, pushing the larger XP after the shorter YP, and thus we see that the constituent length effect is confirmed.

Table 6. Basic/typical vs. reverse order when XP > YP

<table>
<thead>
<tr>
<th>Type</th>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic/typical order</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>8     (32.00 %)</td>
</tr>
<tr>
<td>Reverse order</td>
<td>12</td>
<td>5</td>
<td>0</td>
<td>17    (68.00 %)</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>8</td>
<td>1</td>
<td>25    (100.00 %)</td>
</tr>
</tbody>
</table>

Consider the following examples of reverse orders with XP > YP asymmetry:

(12) o proeðros bus estile [PP stis vrikseles] [NP to No 2 tu steit department robert zelits] (Type 1)

‘President Bush sent to Brussels the State Department’s No. 2 official, Robert Zelitch.’

(13) ftani [PPa me arɣa vimata] [PPc sto kendro tu iparksiaku provlimatos tu anθropu] (Type 2)

‘He/she/it arrives at a slow pace at the centre of man’s existential problem.’

11) Or 23.4 %; see note 9.
However, the remaining 8 cases (32.00%), where the basic/typical orders are maintained and syntactic weight is disconfirmed, although few in actual number, represent a percentage which is not negligible and could prove quite enlightening with respect to the operation of competing linearization “forces”. In essence, these are the cases where it could be argued that the syntactic and/or lexical/semantic relation “wins” over syntactic weight, which confirms our hypothesis.

4.1.3.1. Basic/Typical Order with XP > YP

Hawkins tries to justify the occurrence of basic/typical orders with XP > YP in terms of the new way of calculating the relative strength of competing linearization factors in the form of his proposed Total Domain Differential (TDD) metric (see Section 2.1 above). What seems to underlie the introduction of this new metric is his attempt not to completely give up his earlier very strong claims about the primacy of syntactic weight as defined in his EIC principle over other competing forces for ordering preferences.

The limited number of structures with basic/typical orders and XP > YP observed in our Greek data does not allow us to make any unfailing claims about the operation of linearization factors. It would still be interesting to examine in detail these patterns in order to gain some insight as to the extent that Hawkins’s predictions are borne out with respect to such cases. (Please note that for ease of presentation we are introducing and will be consistently using our own labels, i.e. Xd(ependent) instead of Hawkins’s Pd, and Yi(ndependent) instead of Hawkins’s Pi, in those parts of the paper where our discussion focuses on domain minimization and related concepts.)

**TDD Predictions**

For Xd > Yi PCD and LD conflict

(a) [V Xd Yi] LD preference ≥ PCD preference
   (i.e. the size of Yi ≥ weight difference)

(b) [V Yi Xd] PCD preference ≥ LD preference
   (i.e. weight difference ≥ the size of Yi)

According to Hawkins (2004: 120), the TDD predictions are based on the weight difference (Xd–Yi) and the size of Yi. Interpreting these predictions, we can see that the competing preferences essentially operate in opposite directions:

- Phrasal Combination Domain (PCD, see Section 2.1 above) prefers [V Yi Xd] and Hawkins measures this preference in terms of the difference of the absolute size of Xd and Yi in number of words, i.e. Xd–Yi = n and this n (1, 2, 3 etc. words) is an indication of the degree of preference between the ‘typical’/‘basic’ [V Xd Yi] order vs. the ‘reverse’ [V Yi Xd] order prompted by the length of Xd.
Lexical Domain (LD, see Section 2.1 above) prefers \([V Xd Yi]\) and Hawkins measures this preference in terms of the size \(m\) (in number of words) of a potentially intervening \(Yi\) that could give rise to the LD dispreferred \([V Yi Xd]\) order.

What is noteworthy here is that the size of the intervening \(Yi\) is in actual fact a measurement of the degree of the dispreference of \([V Yi Xd]\) over \([V Xd Yi]\), as the greater the size of \(Yi\) the longer the distance between \(V\) and \(Xd\) which are semantically related. This dispreference is implicitly phrased by Hawkins (2004: 120–121) as a preference for the \([V Xd Yi]\) order, i.e. LD prefers \([V Xd Yi]\) (over \([V Yi Xd]\)) by \(m\) words (\(m = \) size of \(Yi\)). It becomes clear that the LD preference for \([V Xd Yi]\) is negatively defined since it is presented as being prompted by the degree of dispreference of its reverse \([V Yi Xd]\) order (as if the latter were the default one), rather than by lexical/semantic considerations.

To sum up:

- PCD \textit{prefers} \([V Yi Xd]\) (over \([V Xd Yi]\)) by \(n\) words \(n = Xd–Yi\)
- LD \textit{disprefers} \([V Yi Xd]\) (in favour of \([V Xd Yi]\)) by \(m\) words \(m = \) size of \(Yi\)

The TDD, as proposed by Hawkins, is the differential between \(n\) and \(m\). Therefore, according to the related predictions,

(i) if \(n > m\), then the PCD preferred order \([V Yi Xd]\) wins
(ii) if \(m > n\), then the LD preferred order \([V Xd Yi]\) wins.

Let us now apply the TDD test on our Greek data across concordance Types 1, 2 and 4. As we shall see, despite their very restricted number, these 8 constructions prove quite informative.

Prediction (a): if LD preference \(\geq\) PCD preference (i.e. the size of \(Yi\) \(\geq\) weight difference)
order predicted: \([V Xd Yi]\)

Type 1 concordance \([V NP PP]\), where \(Xd = NP\) and \(Yi = PP\):

(14) \textit{evale} \([NP \text{ta } \tilde{d}jafora \text{ kutja ke tis sakules}] \ [PP \text{ se mja meyali tsanda}]
put-past\text{-}3sg the various boxes\text{-}acc and the bags\text{-}acc in a big handbag\text{-}acc

‘She put the various boxes and the bags into a big handbag.’

TDD metric: \(Xd–Yi = 6 - 4 = 2, \quad n = 2\)
\(Yi = 4, \quad m = 4\)

Order attested: \([V Xd Yi]\), as predicted

Type 2 concordance \([V PP_c PP_a]\), where \(Xd = PP_c\) and \(Yi = PP_a\):
(15) a. enas trelos beni [PPc s’ ena burðelo stin uatika]
    a mad-NOM enter-PRES-3SG in a brothel-ACC in-the Uatika-ACC
    [PPa se katastasi amok]
    in condition-ACC amok-GEN
    ‘A mad person running amok enters a brothel in Uatika.’
    TDD metric: Xd–Yi = 5 – 3 = 2, n = 2
    Yi = 3, m = 3
    Order attested: [V Xd Yi], as predicted

b. bike [PPc sti sxoli kalon texnon tis jenetiras tu]
    enter-PAST-3SG in-the School-ACC Fine Arts-GEN the birthplace-GEN his
    [PPa me δaskalo ton Guglielmo Piz]
    with teacher-ACC the Guglielmo Piz-ACC
    ‘He entered the School of Fine Arts of his birthplace, having as his teacher Guglielmo Piz.’
    TDD metric: Xd–Yi = 7 – 5 = 2, n = 2
    Yi = 5, m = 5
    Order attested: [V Xd Yi], as predicted

Type 4 concordance [V PPlex PP], where Xd = PPlex and Yi = PP:

(16) i angira θa kaθete [PPlex stin eθusa anamonis]
    the Ankara-NOM fut.partcl sit-3SG in-the room-ACC waiting-GEN
    tis evropaikis enosis] [PP ja aprosðjoristo akoma ðjastima]
    the European Union-gen for unspecified-acc still period-acc
    ‘Ankara will be sitting in the waiting room of the European Union for a yet unspecified period of time.’
    TDD metric: Xd–Yi = 6 – 4 = 2, n = 2
    Yi = 4, m = 4
    Order attested: [V Xd Yi], as predicted

In all four cases, the value of m is higher than that of n (m > n), which means that, according to Hawkins’s TDD prediction (a), the relation holding between the V and the Xd prevails and should therefore prompt the order [V Xd Yi]. As we saw above, this prediction is confirmed in our data since it is indeed the order attested.

Prediction (b): if PCD preference ≥ LD preference
(i.e. weight difference ≥ the size of Yi)
order predicted: [V Yi Xd]

Type 1 concordance [V NP PP], where Xd = NP and Yi = PP:

(17) a. stelni [NP ke tus δinatus tis δiplomates] [PP sti mosxa]
    send-PRES-3SG and the powerful her diplomats-ACC to-the Moscow-ACC
    ‘She is also sending her powerful diplomats to Moscow.’
TDD metric: \( \text{Xd–Yi} = 5 - 2 = 3, \quad n = 3 \)
\( \text{Yi} = 2, \quad m = 2 \)
Order attested: \([\text{V Xd Yi}]\), disconfirming prediction

b. evale \[\text{NP} \text{ta xartja ke tis foyografies}\] \[\text{PP} \text{sto fakelo}\]
\begin{tabular}{l}
put-past-3sg \text{the papers-acc and the photos-acc in-the envelope-acc} \\
\end{tabular}
‘He/she put the documents and the photos in the envelope.’

TDD metric: \( \text{Xd–Yi} = 5 - 2 = 3, \quad n = 3 \)
\( \text{Yi} = 2, \quad m = 2 \)
Order attested: \([\text{V Xd Yi}]\), disconfirming prediction

As we can see, in these two cases the value of \( n \) is higher than that of \( m \) (\( n > m \)), and thus the order predicted by Hawkins should be \([\text{V Yi Xd}]\). However, the order actually attested in both cases is \([\text{V Xd Yi}]\), which means that it is the syntactic relation holding between the \text{V} and the \text{Xd} (i.e. the adjacent \text{NP}) which appears to determine the order. Hence, Hawkins’s TDD prediction under (b), namely, that constituent length would prevail as a linearization factor in such cases, is not borne out in our data.

Having tested Hawkins’s TDD predictions for cases where either the LD preference or the PCD preference is stronger, we consider it imperative at this point to make the following subtle observation: On closer examination, both conditions presented as prompting each one of the two preferred orders proposed by Hawkins under his TDD predictions for cases where \text{Xd} > \text{Yi} prove to be essentially twofold. More specifically, alongside the clear cases where either the LD preference or the PCD preference is stronger—thus triggering two different orders, i.e. either \([\text{V Xd Yi}]\) (prediction (a)) or its reverse \([\text{V Yi Xd}]\) (prediction (b)), respectively—both conditions include the additional possibility of the LD preference and the PCD preference being equal. This extra possibility is obviously identical, although expressed as LD preference = PCD preference under (a) but as PCD preference = LD preference under (b). It is self-evident that when the two preferences (PCD and LD) are equal, no matter how this is expressed, there cannot be any actual prediction, i.e. any of the two orders could be expected. Yet, Hawkins makes two distinct predictions, one for each of the two phrasings, namely order \([\text{V Xd Yi}]\) when LD preference = PCD preference and its reverse \([\text{V Yi Xd}]\) when PCD preference = LD preference. Despite this ungrounded and counterintuitive distinction, what Hawkins’s proposed account essentially amounts to is that no explicit commitment is made as to the preference for a specific order, given that both orders are presented as potentially occurring. In conclusion, Hawkins’s account does not ultimately predict any particular order for cases where PCD and LD preferences are equal.

It would be interesting for our analysis, however, to check which one of the competing orders is actually preferred in the two instances attested in our data.
where PCD and LD preferences are equal. If the \([V \timesd Y\)] is in fact preferred over \([V \timesd Y\)]
then this could indicate that it is the LD preference which basically
prevails even when the two forces have the same quantitative value according
to the new TDD metric.

Type 1 concordance \([V \text{NP PP}], \text{where } \timesd = \text{NP} \text{and } Y = \text{PP}:

(18) vazi [\text{NP} to \delta \text{iko tis isoxroma} [\text{PP sti pro} \gamma \text{rama}]
put-pres-3sg the own-acc her timbre-acc in-the programme-acc

‘She adds her own timbre to the programme.’

TDD metric: \(\timesd - Y = 4 - 2 = 2, \quad n = 2\)
\(Y = 2, \quad m = 2\)

Type 2 concordance \([V \text{PP}_c \text{PP}_a]), \text{where } \timesd = \text{PP}_c \text{and } Y = \text{PP}_a:

(19) bike [\text{PP}_c \text{ston enaerio xoro tis ela} \delta \text{as} [\text{PP}_a \text{xoris kamia epikinonia}]
enter-past-3sg in-the airspace-acc the Greece-gen without any communication-acc

‘It entered the airspace of Greece without establishing any radio communication.’

TDD metric: \(\timesd - Y = 6 - 3 = 3, \quad n = 3\)
\(Y = 3, \quad m = 3\)

In these two cases where the values of \(n\) and \(m\) are equal, i.e. none of the two
preferences is stronger than the other, the order attested is \([V \timesd Y]\). This could
be interpreted as an indication that the relation holding between the \(V\) and the
\(\timesd\) (namely, the adjacent NP or PP\(_c\), respectively), i.e. the LD preference, plays
an important role in determining order.

Summing up the examination of our data above—i.e. instances of basic/typ-
ical orders with XP larger in size than YP—we can observe that: In 4 out of the 8
cases under discussion, the LD preference is stronger than the PCD preference
and the attested order \([V \timesd Y]\) is the one predicted according to Hawkins’s
TDD. In 2 cases, although it is the PCD preference which is stronger, the attested
order is again \([V \timesd Y]\), contrary to Hawkins’s TDD prediction that it should be
\([V Y \timesd]\). In the remaining 2 cases, although any of the two orders could poten-
tially occur as none of the two preferences is stronger than the other, it is once
more order \([V \timesd Y]\) which is selected.

These findings could be interpreted as lending support to our insights that
the syntactic and/or lexical/semantic relations holding between the \(V\) and an
adjacent \(\timesd\) constituent in the VP is a strong linearization factor, often prevail-
ing over constituent length.
5. Conclusions

Our findings, despite the restricted size of our data sample, can be considered to lend support to the hypothesis proposed in this paper, namely that syntactic and/or lexical/semantic relations holding between adjacent constituents underlie the resistance to the effect of constituent length. In particular, it appears that the constituent length factor is not more important than the syntactic and/or lexical/semantic relations holding between elements in the Greek VP, i.e. between (a) the V and an NP-complement, (b) the V and a PP-complement, and (c) the V and a lexically dependent PP. More specifically, constituent length is indeed a force responsible for the postposition of heavy constituents, yet syntactic and/or lexical/semantic relations intrinsically motivate the adjacency of elements which “belong together conceptually”. The following findings point towards these conclusions, which, of course, need to be further investigated with additional data. In particular:

When XP and YP are equal in size, the relative frequency of basic/typical vs. reverse orders—i.e. [V XP YP] vs. [V YP XP]—is an indication of the strength of the operation of the syntactic and/or lexical/semantic relations. If these relations did not favour adjacency, then we would expect a more or less equal distribution of the two orders. Yet, in 4/5 of the data the V and the syntactically and/or lexically/semantically related constituent XP are adjacent, which means that the syntactic and/or lexical/semantic relation involved prompts and maintains adjacency.

When XP is larger in size than YP, in about 2/3 of the cases it is constituent length which prevails since the reverse orders [V YP XP], whereby the lengthier XP constituent is postposed, are observed. However, in the remaining 1/3 of the data, the basic/typical orders [V XP YP] are maintained and, therefore, constituent length is disconfirmed. One could argue that these findings point to the prevalence of the syntactic and/or lexical/semantic relation between the V and an adjacent XP over constituent length, since it appears that the syntactically and/or lexically/semantically prompted adjacent positions of elements are not easily “abandoned” in response to minimal constituent length differences. In other words, basic linearization patterns are not automatically reversed when constituent length differences are small.

To conclude, the analysis of our data suggests that, unlike constituent length which may prompt the postposition of lengthy constituents, thus bringing about the disruption of adjacency of elements “belonging together”, syntactic and/or lexical/semantic relations holding between the V and an adjacent XP intrinsically motivate their adjacency, thus resisting any rearrangement that would separate them.
References


