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Greek word order: three descriptive models

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The purpose of this paper is to examine two aspects of word order in main clauses in the Greek of Herodotos (a Greek historian of the fifth century BC, who wrote in the Ionic dialect).

1. The first step will be to take a head/modifier count to see whether the various elements of the main clause precede or follow their head (the verb)[1].
2. The second step will be to take a selection of modifiers in pairs to see whether the various modifying elements are ordered in relation to each other.

Studies 1. and 2. will be controlled by means of statistical tests: the binomial[2] and the chi square[3] (written X^2). These tests will be used to evaluate a random hypothesis, i.e. the hypothesis that in 1. the modifiers are not ordered in relation to their heads and in 2. the modifiers are not ordered in relation to each other .

In practice the statistical tests will be used to calculate in each

[1]Much of the published work on Greek word order is devoted to counting the number of elements before and after the verb. See e.g. Delbrück 1911, Frisk 1933 and Dover 1960. These authors use raw figures and percentages without applying statistical tests.

[2]The binomial statistic is based on the analogy of tossing a coin. For each toss there are two possible outcomes (heads and tails). If the coin is not biased, any trial should show about the same number of heads as tails. For the purpose of this paper, the binary data in the sample (the observed values) are compared with the values to be expected if the data are random (comparable with the tossing of an unbiased coin). In each test, the value of the binomial is looked up in a set of tables to find the probability that the result is random.

[3]The chi square (X^2) is a measure of difference. It is used here to compare two sets of numbers, i.e. the pairs of observations in the sample with the values predicted by the null hypothesis. As the value of X^2 increases the probability of the null hypothesis decreases. The probability of any given value of X^2 can be found in the appropriate statistical tables.

instance the probability[4] that the null (random) hypothesis is valid. If the probability is very low, i.e. 0.05 or lower, the null hypothesis will be abandoned and replaced by the claim that the elements are ordered as indicated by the counts and percentagesin Table I.

For study 1. the figures are displayed in Table I[5]. Here the order of each modifier in relation to its head is shown by the numbers and percentages. The associated probabilities indicate whether the results are significant. An inspection of the table shows that six modifiers, namely T, C, G, S, O[6] and Io are preposed; four, namely Al, I, F, and Nc are postposed and one namely Ab[7] is random. So there is a mixture of order and randomness in the model.

The data for stage 2. are presented in Table II. These data will be used to test the claim that the relative order of paired modifiers can be predicted by their percentage frequency before or after the verb as seen in Table I. To be more precise it is possible to assign to each modifier studied a positive or negative index. For example, element T has an index of [-96.85] and C has an index of [-86.11]. The theory predicts that T should precede C. Likewise I has an index of [+88.77] and F has an index of [+93.33]. F should therefore appear after I. This theory, the theory of polarities, was originally developed in Dunn (1981).

In Table II the pairs of modifiers in the left hand column are placed

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[4]The probability P of any given result is represented by a decimal fraction between zero and one, where one = certainty.

[5]The list in Table I opens with subordinate clauses (T&C), which are followed by the absolute participle (G). Next come the NPs (S, O and Io); then the prepositional phrases (Ab and Al); then the infinitive (I), and finally the clauses F and Nc. This order compares favourably with Simon Dik's theory of LIPOC (language independent preferred order of constituents as stated in Dik 1980:23 and 1981:192-193).

For an account of head modifier behaviour in the Indo-European languages see Hawkins 1983; also Friedrich 1975.

[6]Participles in Greek adopt the position of the corresponding subordinate clauses. In word order research little attention has been paid to the Greek participles. The fullest account of the Greek subordinate clauses can be found in Monteil 1963. For the infinitive see Burguière 1960.

[7]Since inflected (full) words in ancient Greek are mobile (Dover 1960), the number of possible orders for n inflected words is n!. This means that in a sentence of 10 words the number of possible orders is over three million. No author needs this amount of freedom, and it is not surprising that randomness plays a substantial part in the ordering of words in the Greek sentence. It is probable that ancient Greek has freer word order than any other natural language.

in the order predicted by the theory of polarities. The outcome of the tests shows which modifier pairs follow the polarity theory (this result requires a probability of 0.05 or less), which are random (this result requires a higher probability), and which are evidence against the theory (this result requires a low probability and contradictory percentages).

A glance at Table II shows that there are six random sequences: T+G, T+S, C+S, O+Ab, O+Al and S+Io. The remaining pairs all support the model. In fact there is no evidence against it. So the theory is sustained by the data - always with the proviso that there is a random factor involved.

The last model to be tested is relatively simple. This model claims that modifiers of the verb fall into three classes:

[i] Initial elements namely : G, T, C.

[ii] Medial elements namely : S, O, Io.

[iii] Final elements namely : I, F, Al, Ab, Nc.

In general Initial elements precede Medial elements and Medial elements precede Final elements.

It will be noticed in Table II that there are no counterexamples to our third descriptive model. The random interference in the groups T+G, T+S, C+S, O+Ab O+Al and S+Io has already been noticed. It must also be admitted that this model does not predict the relative order of two elements which are both initial, both medial or both final. For that purpose it is necessary to have recourse to the theory of polarities. Each of the models tested has produced similar results. It is important also to note that the two statistical methods have been consistent and are both appropriate for the task for which they have been used.

In closing this argument it is necessary to emphasize the great flexibility of word order in Ancient Greek, where almost anything is possible. In explaining sequences of words in actual text two factors must be kept in mind:

[i] style (author's choice);

[ii] random variation.

It is often difficult to decide between [i] and [ii]. Often an example appears to be influenced by several factors at once. To illustrate

the considerations involved selected sentences have been taken from Herodotos I. The sentences chosen all exhibit subject movement (the subjects are underlined). The examples, with translation and explanation follow in Appendix I.

Appendix I: Subject Movement

35, 1. ekhontos de hoi en khersi tou paidos ton gamon, apikneetai es tas Sardi:s ane:r sumphore:i ekhomenos kai ou katharos kheiras.

'His son's marriage was in hand when a man arrived at Sardis, who was suffering misfortune and had unclean hands.'

1. The initial position has been taken by the absolute construction (*ekhontos...ton gamon*).
2. The subject is expanded and rather long .So it suits a position at the end of the sentence.

81, -. toisi men de: kateste:kee poliorkie:

'Those men were under siege.'

1. The demonstrative *Ho* normally appears at the front of the sentence.
2. Here *toisi* (from *Ho*) is the semantic subject. Cf. *poliorkie:* which is the grammatical subject, but, being a verbal noun, is the semantic predicate.

85, 3. ...e:ie gar to:n tis Perseo:n allogno:sas Kroison ho:s apokteneo:n...

'for one of the Persians was going to kill Kroisos whom he had not recognised.'

1. The verb tends to come first in *gar* clauses.
2. The verb *e:ie* is relatively weak and forms a periphrasis with the participle *apokteneo:n*.

112, 2. tetoka gar kai ego:, tetoka de tethneos.
'For I too have given birth, but I have given birth to a dead child.'
1. The emphasis has been put on the repeated initial verb *tetoka*. The position of choice for this figure (anaphora) is the front of the clause.
2. The sentence is emotional. Hence the inversion of subject and verb.

120, 4. ameibetai ho Astuage:s toiside.
'Astyages replies with these words.'
1. Verbs of saying often open the sentence. Cf. the English *Quoth he, said she* etc.
2. The subject *Astyage:s* is expected in context and can thus be postponed.

131, 3. kaleousi de Assurioi te:n Aphrodite:n Mulitta, Arabioi de Alilat, Persai de Mitran.
'The Assyrians call Aphrodite Mylitta, the Arabs call her Alilat, and the Persians call her Mitra'.
1. The verb *kaleousi* goes with three subjects. It is natural to place it first as the more general element.
2. In Greek gapping to the right is preferred to gapping to the left.

180, 1. exiei de houtos es te:n Eruthre:n thalassan.
'This (river) flows into the Red Sea.'
1. Geographic verbs are often placed first in descriptive passages.
2. Cf. the preceding sentence with long subject:
180, 1. rheei de ex Armenio:n eo:n megas
etc
'It flows out of Armenia, being large etc.'

MOD	PRE	POST	TOTAL	X^2	P	BIN	P
T	154(96.85%)	5(3.15%)	159	139.63	0.001	11.739	0.001
C	31(86.11%)	5(13.89%)	36	18.78	0.001	4.167	0.001
G	98(84.49%)	18(15.51%)	116	55.17	0.001	7.335	0.001
S	651(75.26%)	214(24.74%)	865	220.77	0.001	14.824	0.001
O	470(53.47%)	409(46.53%)	879	4.23	0.050	2.024	0.022
Io	109(64.50%)	60(35.50%)	169	14.21	0.001	3.692	0.001
Ab	26(52%)	24(48%)	50	0.08	0.500	0.141	0.444
Al	53(28.65%)	132(71.35%)	185	33.74	0.001	5.735	0.001
I	31(11.23%)	245(88.77%)	276	165.93	0.001	12.821	0.001
F	1(6.67%)	14(93.33%)	15	11.27	0.001	3.098	0.001
Nc	1(4.17%)	23(95.83%)	24	20.17	0.001	4.287	0.001

T=temporal clause C=conditional clause G=genitive absolute
S=subject O=direct object Io=indirect object
Ab=ablative phrase Al=allative phrase I=infinitive
F=final clause Nc=noun clause object

Table I: Modifiers of verbs

ORDER	FOR	AGAINST	TOTAL	X^2	P	BIN	P
T+G	6	8	14	0.29	0.700	0.267	0.390
G+S	57	20	77	17.78	0.001	4.103	0.001
G+O	42	6	48	27.00	0.001	5.052	0.001
G+Al	18	3	21	10.71	0.010	3.055	0.001
G+I	20	3	23	12.57	0.001	3.336	0.001
T+S	39	46	85	0.58	0.500	0.651	0.260
T+O	86	7	93	67.11	0.001	8.088	0.001
T+Al	34	0	34	34.00	0.001	5.659	0.001
T+I	21	0	21	21.00	0.001	4.364	0.001
C+S	10	4	14	2.57	0.200	1.336	0.090
C+O	18	2	20	12.80	0.001	3.354	0.001
S+O	323	146	469	66.80	0.001	8.127	0.001
S+Ab	24	9	33	6.82	0.010	2.437	0.008
S+Al	90	21	111	42.89	0.001	6.454	0.001
S+I	117	6	123	100.17	0.001	9.918	0.001
S+Nc	13	1	14	10.29	0.010	2.940	0.002
O+Ab	14	7	21	2.33	0.200	1.309	0.097
O+Al	38	34	72	0.22	0.700	0.354	0.360
O+I	23	1	24	20.17	0.001	4.287	0.001
T+Io	11	1	12	8.33	0.010	2.598	0.005
C+Io	9	1	10	6.40	0.020	2.214	0.014
S+Io	70	74	144	0.11	0.800	0.250	0.400
Io+O	59	31	90	8.71	0.010	2.846	0.002
Io+I	29	1	30	26.13	0.001	4.930	0.001
O+F	12	1	13	9.31	0.010	2.774	0.003

Table II: Order of modifier pairs

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