Ideology and identity in grammar: A diachronic-quantitative approach to language standardisation processes in Ancient Greek

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Abstract

This paper sets out to disentangle the natural developments leading away from encoding semantic relations by inflectional case towards encoding them by means of prepositions, on the one hand, and the impact of the Attistic language ideology on the development of prepositions on the other. Our aim is to describe the major standardisation trends in the grammar of prepositions in a corpus-based study.

While the Archaic, Classical and Hellenistic periods are characterised by the natural expansion of prepositional patterns across various semantic and syntactic domains, the language of Postclassical Greek is subject to different standardisation processes and ideological influences. Already by the Hellenistic period, we observe the tendency towards consolidation of variation in prepositional usage, being an effect of adopting some of the standards of Koiné. The Roman period, by contrast, again increases variation: Different authors and texts imitate the ideals of the Archaic and Classical periods to varying degrees (Atticism). Accordingly, we refer to the Roman period as a period of *creative standardisation*. The conventionalisation of a set of Attistic patterns takes place only from the Early to Late Byzantine periods. The Late Byzantine period attests more than twice as little variation than the Roman period. Finally, we argue that the expansion of prepositions is not only determined by language change and Atticism but that genres channel the ex-

pansion of prepositional patterns. Historians and early religious texts are the most progressive and less amenable for imitating earlier periods. By contrast, writers of poetry and orators are much more conservative, more resistant to language change and tend to imitate the earlier language layers more faithfully.

Introduction

Language standardisation is a historical and sociolinguistic process by which an over-regional variety emerges with a codified orthography, lexicon and grammar. Ideally, a standardised language shows no diachronic, diatopic or diastratic variation. However, an absolute standardisation can never be achieved (cf. Georgakopoulou 2009, xiii) and it is, therefore, more appropriate to speak of standardisation as an ideology, i.e., 'a set of abstract norms to which actual usage may conform to a greater or lesser extent' (Milroy and Milroy 1999), and thus as a continuum and not a categorical matter. The linguistic material adopted as the set of norms in the standardised variety is often selected consciously on the basis of some linguistic authority, such as the literary tradition and particular writers, in a process of constructing self-identity (see Peterson et al., this volume). One of the salient motivations behind this conscious selection is the wish to link oneself to the tradition and thereby to a particular social subgroup. Revalorisation of varieties that are associated with particular speakers may serve

> 'not just as symbols of group identity, but as emblems of political allegiance or of social, intellectual, or moral worth' (Woolard and Schieffelin 1994, 61, see also the references therein, in particular, on Greek see Strobel 2009, 95; Horrocks 2010, 100).

While research about constructing identity and linguistic ideology primarily focuses on phonetics and lexicon, grammar is less frequently discussed in this context. In this paper, our aim is to investigate the impact of the literary tradition on the grammar of Postclassical Greek, i.e., to explore grammatical Atticism (cf. Strobel 2009, 97). Our aim is to grasp the main statistical tendencies and to disentangle the effects of the expansion of ideological norms from the effects of grammar-driven language change in a bird's-eye perspective as well as to better understand the ways that the mechanisms of the ideological expansion intervene with a grammar-driven language change.

More specifically, we focus on one particular domain of grammar, namely, prepositions. The emergence and expansion of prepositions in Greek has been subject to extensive research (among others Luraghi 2003; Bortone 2010; Seržant and Rafiyenko in press). Ancient Greek underwent substantial changes in its grammar from marking semantic relationships primarily by means of case in its early stages to marking them primarily by prepositions in the Postclassical period. The reduction of the inflectional case system of Ancient Greek may already be observed in the earliest attested period of Mycenean Greek (Hettrich 1985; Hajnal 1995, 16ff). The general tendency to reinforce the old inflectional cases with prepositions already became strong since Homer (Morpurgo Davies 1983, 288; Bortone 2010, 155-156). This process led to the abandonment of the most part of the old case system of Ancient Greek in the course of time. Literary texts do not immediately mirror this change, and literary tradition considerably skews the picture – an aspect that we take under closer inspection below.

We investigate the impact of Atticism on the use of prepositions in a corpus-based study. Atticism refers to the ideological movement in language usage that arose by the end of the 1st century BC to revive lexical but also grammatical properties of the classical language. The motivation behind this movement was that the classical language came to be considered as the ideal variety as opposed to the administrative Koiné that was dissociated from any literary tradition (Schmid 1887-1897; Swain 1996; Schmitz 1997; Silk 2009; Strobel 2009). Originally, the conscious imitation of the classical language produced a new literary register noted as Learned Language, which combines ancient and sometimes artificial, hypercorrect patterns with those actually used in everyday life and adopted from Koiné (cf., i.a., Strobel 2009; Benedetti 2020; García Ramón 2020).

Greek has an exceptionally long documented history, like no other Indo-European language (Morpurgo Davies 1985, 75) with a large digital collection of texts for all periods (Thesaurus Linguae Graecae, http://stephanus.tlg.uci.edu/, henceforth TLG). This allows us to approach our research questions quantitatively by using a dataset created on the basis of a subcorpus of TLG (Rafiyenko and Seržant 2021). The reason for applying a usage-based approach is that the variation we observe is – as expected for any linguistic ideological norms – not graspable with categorical judgements but is rather probabilistic in nature. Moreover, the corpus-based method provides for falsifiable claims. Our study follows previous philological research on prepositions that crucially relied on corpus counts (cf. various statistical studies on prepositions in Xenophon, Isocrates, Thucydides, and some other Attic prose, e.g., Abel 1927, 215; Bortone 2010, 177-182; Koch 1889, 35; Lutz 1891, 6; Mommsen 1895, 6; Martínez Valladares 1973, 192; Sobolewskij 1890, 65; Westphal 1888, 2).

We proceed as follows: in the first section, we describe our subcorpus and the prepositions to be investigated here. In the next section, we discuss the evidence and the results. To do so, we first discuss the common trends for all prepositions at issue and then deal with particular prepositions. The final section presents our conclusions.

Our corpus

For our study, we selected 18 prepositions (Table 1).

We chose the older layer of prepositions, sometimes – traditionally – referred to as "proper prepositions" (cf. Smyth 1956, §1681-1698), while more recent prepositions, such as μεταξύ, μέχρι, ὁμοῦ, and ὄπισθεν (cf. Smyth 1956, § 1699-1702), have been left out. The former occur more frequently in the corpus than the latter ones. The only exception is ἀμφί, which is found less frequently and disappears from the colloquial language very early.

Our data stems from TLG (Thesaurus Linguae Graecae) with 104,526,008 words as of June 2017. Our subcorpus consists of ca. 34 million words (as of June 8, 2018). The selected prepositions occur 2,199,561 times in our subcorpus, as opposed to TLG, where they occur nearly three times as often. The overall relative frequency of the 18 selected prepositions accounts for 66.3 words per thousand in TLG and for 64.9 per thousand in our corpus. The entire dataset underlying this study is published in Rafiyenko and Seržant (2021).

Dictionary form	Absolute Frequency		Relative frequency	
	TLG*	Our corpus	TLG*	Our corpus
ἀμφί	8,873	3,456	0.08	0.10
ἀνά	16,600	4,100	0.16	0.12
ἀντί	79,545	18,201	0.76	0.54
ἀπό	372,201	95,391	3.56	2.82
διά	614,259	197,677	5.88	5.83
εἰς	765,179	242,155	7.32	7.15
ἐκ	565,350	180,566	5.41	5.33
ἐν	1,148,618	383,822	10.99	11.33
ἐπί	601,443	195,489	5.75	5.77
κατά	693,853	208,372	6.64	6.15
μετά	296,690	93,895	2.84	2.77
παρά	306,674	94,929	2.93	2.80
περί	399,581	129,811	3.82	3.83
πρό	68,632	21,378	0.66	0.63
πρός	609,650	208,368	5.83	6.15
σύν	56,718	15,379	0.54	0.45
ὑπέρ	95,356	35,854	0.91	1.06
ὑπό	230,820	69,852	2.21	2.06
Total	6,930,042	2,198,695	66.29	64.90

Table 1. The frequency of prepositions (the counts for TLG are given as of June 1, 2017); the relative frequencies are per 1000 words.

TLG has been lemmatised automatically and is, therefore, not always reliable in case of homonymy and/or homography. For this reason, we selected those prepositions that do not tend to have homographical forms with other words.[1]

The selection of authors – 70 in total (Table 2) – was motivated by the following criteria. First, the length of the texts should be reasonably long as to allow for statistically significant judgements. Secondly, we somewhat preferred authors with an affinity to the spoken register of the period rather than the authors of highly stylistically affected texts (consequently, we have predominantly chosen prose texts and less poetry). Thirdly, in order to balance biases arising from different text genres, we selected sets of authors for each period that are comparable thematically and genre-wise to the extent that the text attestation of Ancient

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1 There are two exceptions. First, the prepositions *en* and *eis* are homonymous with the numeral εἷς, μία, ἕν. However, this homonymy (947 homonymic forms in total) is not significant given the overall number of occurrences of *en* (383,961) and *eis* (242,320) in our corpus. The error does not exceed 0.15%. The other homonymic pair is the apocopated allomorph ἀν'/ ἄν' of the preposition ἀνά (cf. Smyth 1956, §75D) that graphically coincides with the modal particle ἄν. The relative frequency of the allomorph as opposed to the total frequency of the preposition ἀνά in our subcorpus is also extremely low.

Greek allowed us to do so. Each author has been attributed to one of the seven idealised historical periods based on what is known about the author's life span:[2]

i. Archaic period (8-6 century BC; *e.g.* Homer, Hesiod),

ii. Classical period (5-4 century BC; *e.g.* Plato, Thucydides),

iii. Hellenistic period (3-1 century BC; *e.g.* Diodorus, Nicolaus Damascenus),

iv. Roman period (AD 1-3 century; *e.g.* Plutarch, Arrianus),

v. Early Byzantine period (AD 4-7 century; *e.g.* Johannes Malalas, Johannes Antiochenes),

vi. Middle Byzantine period (AD 8-11 century; *e.g.* Symeon Logothetes, Michael Psellus),

vii. Late Byzantine period (AD 12-15 century; *e.g.* Georgius Pachymeres, Gregorius Palamas).

Division into periods is based on the division into centuries as given in TLG. We selected the authors in such a way that we would have at least one author per century (while certain centuries have many more authors).[3]

Some of the authors do not entirely match the criteria mentioned above. For example, the selection of texts for the Archaic period is less faithful with regard to the above-mentioned second and third criteria. Moreover, Homer's texts are certainly not homogenous dialectally and, possibly, diachronically. The New Testament is also problematic with regard to its homogeneity. However, as both are important witnesses of their periods, it was important to include them.

Texts collected in our corpus belong to different literary genres. Based on the information provided by TLG, we attributed each of the 70 authors to one of the eight categories that roughly correspond to the commonly adopted genre designations (Table 3). Each author has been attributed one singe genre, which is a minor simplification.[4]

As we argue below, the genres may be grouped together into two larger clusters. The first cluster contains historiography, religious texts and the texts of the authors who wrote in different genres. It is the largest cluster of the two. The second cluster is considerably smaller and contains such genres as poetry, oratory, philosophy and some other genres.

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2   We had to make some ad-hoc decisions in ambiguous cases, *e.g.*, when the lifetime of an author cannot be properly determined (*e.g.* Hesiodus or Heliodorus), when one text has been written over a span of more than one century (the Septuagint and the New Testament), or when authors cannot be unambiguously attributed to one of the periods because they lived in the transition between two periods (*e.g.* Menander or Flavius Josephus).

3   The word count per century ranges from 0.1 to 12.9 million words (AD 4) with an average of 1-2 million words per century.

4   Within the scope of this study, it was not possible to systematically test whether one and the same author considerably diverges in prepositional usage across different genres (for those authors who wrote in different genres). The preliminary evidence does not seem to speak in favour of such an assumption. Thus, we tested whether Xenophon has largely the same frequency of prepositions in his *Anabasis* vs. all his works. The frequencies do not significantly diverge from each other with 48/1000 vs. 50/1000, respectively.

| TLG-number | Latin name (TLG) | Word count (TLG) | Relative frequency of 18 prepositions per thousand | Genre (corpus) | Dating | | Our periodisation |
					Century (TLG)	Century (corpus)	
0012	Homerus	199,251	49.86	EPIC	8 BC	8/7 BC	Archaic
0020	Hesiodus	26,626	45.18	EPIC	8/7 BC?	8/7 BC	Archaic
0085	Aeschylus	81,504	41.07	TRAG	6-5 BC	6 BC	Archaic
0003	Thucydides	150,196	71.82	HIST	5 BC	5 BC	Classical
0010	Isocrates	120,506	63.10	ORAT	5-4 BC	5 BC	Classical
0016	Herodotus	185,554	64.50	HIST	5 BC	5 BC	Classical
0014	Demosthenes	296,539	52.69	ORAT	4 BC	4 BC	Classical
0017	Isaeus	32,744	50.21	ORAT	5-4 BC	4 BC	Classical
0019	Aristophanes	116,951	36.65	COM	5-4 BC	4 BC	Classical
0026	Aeschines	48,845	61.73	ORAT	4 BC	4 BC	Classical
0032	Xenophon	315,469	50.36	HIST	5-4 BC	4 BC	Classical
0059	Plato	591,143	42.89	PHILOS	5-4 BC	4 BC	Classical
0086	Aristoteles et Corpus Aristotelicum	1,076,439	61.15	SCI	4 BC	4 BC	Classical
0540	Lysias	78,074	65.21	ORAT	5-4 BC	4 BC	Classical
0541	Menander	80,882	28.93	COM	4-3 BC	4 BC	Classical
0593	Gorgias	9,616	44.41	ORAT	5-4 BC	4 BC	Classical
0543	Polybius	316,866	90.89	HIST	3-2 BC	3 BC	Hellenistic
0552	Archimedes	109,980	84.15	SCI	3 BC	3 BC	Hellenistic
1264	Chrysippus	192,890	54.26	PHILOS	3 BC	3 BC	Hellenistic
0527	Septuaginta	623,781	82.51	REL	3 BC/ AD 3	2 BC	Hellenistic
0060	Diodorus	464,305	82.05	HIST	1 BC	1 BC	Hellenistic
0577	Nicolaus Damascenus	34,939	71.73	HIST	1 BC	1 BC	Hellenistic
0007	Plutarchus	1,036,815	58.42	VAR	AD 1-2	AD 1	Roman
0074	Arrianus	141,772	77.83	HIST	AD 1-2	AD 1	Roman
0526	Flavius Josephus	475,709	74.55	HIST	AD 1	AD 1	Roman
0612	Diochrysosto-mus	179,346	47.38	ORAT	AD 1-2	AD 1	Roman
0031	Novum Testamentum	137,938	75.37	REL	AD 1	AD 1	Roman

Table 2. Authors included in our corpus.

TLG-number	Latin name (TLG)	Word count (TLG)	Relative frequency of 18 prepositions per thousand	Genre (corpus)	Dating		
					Century (TLG)	Century (corpus)	Our periodisation
0062	Lucianus	281,064	51.92	VAR	AD 2	AD 2	Roman
0385	Cassius Dio	546,840	65.64	HIST	AD 2-3	AD 2	Roman
0551	Appian	226,924	78.22	HIST	AD 1-2	AD 2	Roman
0554	Chariton	34,966	47.10	NOV	AD 2?	AD 2	Roman
0561	Longus	19,858	45.37	NOV	AD 2?	AD 2	Roman
0638	Flavius Philostratus	180,200	58.12	ORAT	AD 2-3	AD 2	Roman
2042	Origenes	1,280,101	77.46	REL	AD 2-3	AD 2	Roman
0532	Achilles Tatius	41,869	53.52	NOV	AD 2	AD 2	Roman
0658	Heliodorus	76,434	56.90	NOV	AD 3?	AD 3	Roman
0641	Xenophon Ephesius	16,569	56.25	NOV	AD 2/3	AD 3	Roman
0722	Oribasius	503,549	68.35	SCI	AD 4	AD 4	Early Byzantine
2017	Gregorius Nyssenus	788,739	76.09	REL	AD 4	AD 4	Early Byzantine
2018	Eusebius	1,233,487	75.24	REL	AD 4	AD 4	Early Byzantine
2035	Athanasius	734,398	69.27	REL	AD 4	AD 4	Early Byzantine
2040	Basilius Caesariensis	710,152	71.20	REL	AD 4	AD 4	Early Byzantine
2062	Joannes Chrysostomus	4,071,012	55.84	REL	AD 4-5	AD 4	Early Byzantine
2200	Libanius	763,855	51.39	ORAT	AD 4	AD 4	Early Byzantine
4089	Theodoretus	1,300,876	56.57	REL	AD 4-5	AD 4	Early Byzantine
4090	Cyrillus Alexandrinus	2,334,974	72.33	REL	AD 4-5	AD 4	Early Byzantine
4138	Ephraem Syrus	427,012	68.49	REL	AD 4	AD 4	Early Byzantine
2871	Joannes Malalas	102,553	76.40	HIST	AD 5-6	AD 5	Early Byzantine
4029	Procopius	292,548	68.31	HIST	AD 6	AD 6	Early Byzantine

Table 2. continued.

TLG-number	Latin name (TLG)	Word count (TLG)	Relative frequency of 18 prepositions per thousand	Genre (corpus)	Dating		
					Century (TLG)	Century (corpus)	Our periodisation
4394	Joannes Antiochenus	106,954	70.01	HIST	AD 7	AD 7	Early Byzantine
2934	Joannes Damascenus	690,220	63.29	REL	AD 7-8	AD 8	Middle Byzantine
3043	Georgius Monachus	352,928	70.89	HIST	AD 9	AD 9	Middle Byzantine
4040	Photius	1,113,380	62.18	VAR	AD 9	AD 9	Middle Byzantine
3070	Symeon Logothetes	132,538	76.17	HIST	AD 10	AD 10	Middle Byzantine
3115	Symeon Metaphrastes	38,451	56.38	HIST	AD 10	AD 10	Middle Byzantine
2702	Michael Psellus	910,320	57.90	VAR	AD 11	AD 11	Middle Byzantine
3135	Joannes Zonaras	378,901	63.86	HIST	AD 11-12	AD 11	Middle Byzantine
2703	Anna Comnena	145,850	67.34	HIST	AD 11-12	AD 11	Middle Byzantine
4083	Eustathius Thessalonicensis	1,950,642	67.58	VAR	AD 12	AD 12	Late Byzantine
3142	Georgius Pachymeres	653,046	66.84	VAR	AD 13-14	AD 13	Late Byzantine
3236	Nicephorus Callistus Xanthopulus	472,239	67.21	VAR	AD 13-14	AD 13	Late Byzantine
3254	Gregorius Palamas	694,387	67.75	REL	AD 13-14	AD 13	Late Byzantine
4145	Nicephorus Gregoras	575,593	54.88	VAR	AD 13-14	AD 13	Late Byzantine
3169	Joannes VI Cantacuzenus	498,759	67.66	VAR	AD 14	AD 14	Late Byzantine
3251	Philotheus Coccinus	448,689	61.28	REL	AD 14	AD 14	Late Byzantine
3195	Gennadius Scholarius	1,624,669	69.90	REL	AD 15	AD 15	Late Byzantine

Table 2. continued.

	Genre (number of authors / word count)	List of authors
MAJOR CATEGORIES	HIST (18 authors / 6.1 million words)	Herodotus (5 BC), Thucydides (5 BC), Xenophon (4 BC), Polybius (3 BC), Diodorus (1 BC), Nicolaus Damascenus (1 BC), Flavius Josephus (AD 1), Arrianus (AD 1), Appian (AD 2), Cassius Dio (AD 2), Joannes Malalas (AD 5), Procopius (AD 6), Joannes Antiochenus (AD 7), Georgius Monachus (AD 9), Symeon Logothetes (AD 10), Symeon Metaphrastes (AD 10), Joannes Zonaras (AD 11), Anna Comnena (AD 11)
	REL (15 authors / 17.1 million words)	Septuaginta (2 BC), Novum Testamentum (AD 1), Origenes (AD 2), Gregorius Nyssenus (AD 4), Eusebius (AD 4), Athanasius (AD 4), Basilius Caesariensis (AD 4), Ephraem Syrus (AD 4), Joannes Chrysostomus (AD 4), Theodoretus (AD 4), Cyrillus Alexandrinus (AD 4), Joannes Damascenus (AD 8), Gregorius Palamas (AD 13), Philotheus Coccinus (AD 14), Gennadius Scholarius (AD 15)
	VAR (9 authors / 7.5 million words)	Plutarchus (AD 1), Lucianus (AD 2), Michael Psellus (AD 11), Photius (AD 9), Eustathius Thessalonicensis (AD 12), Georgius Pachymeres (AD 13), Nicephorus Callistus Xanthopulus (AD 13), Nicephorus Gregoras (AD 13), Joannes VI Cantacuzenus (AD 14)
SMALLER CATEGORIES	ORAT (9 authors / 1.7 million words)	Isocrates (5 BC), Aeschines (4 BC), Demosthenes (4 BC), Gorgias (4 BC), Isaeus (4 BC), Lysias (4 BC), Dio Chrysostomus (AD 1), Flavius Philostratus (AD 2), Libanius (AD 4)
	SCI (3 authors / 1.7 million words)	Aristoteles et Corpus Aristotelicum (4 BC), Archimedes (3 BC), Oribasius (AD 4)
	PHILOS (2 authors / 784 thousand words)	Plato (4 BC), Chrysippus (3 BC)
	EPIC, TRAG, COM (5 authors / 505 thousand words)	Homerus (8/7 BC), Hesiodus (8/7 BC), Aeschylus (6 BC), Aristophanes (4 BC), Menander (4 BC)
	NOV (5 authors / 190 thousand words)	Achilles Tatius (AD 2), Chariton (AD 2), Longus (AD 2), Xenophon Ephesius (AD 3), Heliodorus (AD 3)

Table 3. Genres covered by our subcorpus (based on the categorisation found in TLG). Lemma: COM: comedy, EPIC: epic poetry, HIST: historiography, NOV: Roman novel, ORAT: orator, PHILOS: philosopher, REL: religious texts, SCI: scientific texts, TRAG: tragedy, VAR: various texts.

Unveiling the hotspots of variation

The grammatical system of encoding semantic roles of participants in a sentence changes in the course of time in Ancient Greek (*i.a.* Delbrück 1893, 647-665; Kühner and Gerth 1898, 526; Smyth 1920; Schwyzer and Debrunner 1975 [1950], 419-436; Chantraine 1958; Dunkel 1979; Horrocks 1981; Vincent 1999; Luraghi 1996; 2003; Hewson and Bubenik 2006; Bortone 2010; Rafiyenko and Seržant 2020). Originally, in the Archaic and, to some extent, in the Classical period, many roles are primarily coded by inflectional case, while prepositions are used for rather specific, semantically more fine-grained distinctions (*e.g.* for spatial relations such as *inside, above, below, etc.*).

By contrast, in the later periods, the inflectional cases lose a number of their original domains in favour of prepositions that gradually take over increasingly more grammatical functions. For example, the recipient of the verb 'to give' is typically marked by the dative case in the Archaic and Classical periods. However, after the Hellenistic period, prepositions are frequently employed to signal the same role (such as *prós* 'to', *eis* 'to'). The gradual disappearance of the dative case from colloquial language is an important step here (cf. Humbert 1930; Blass and

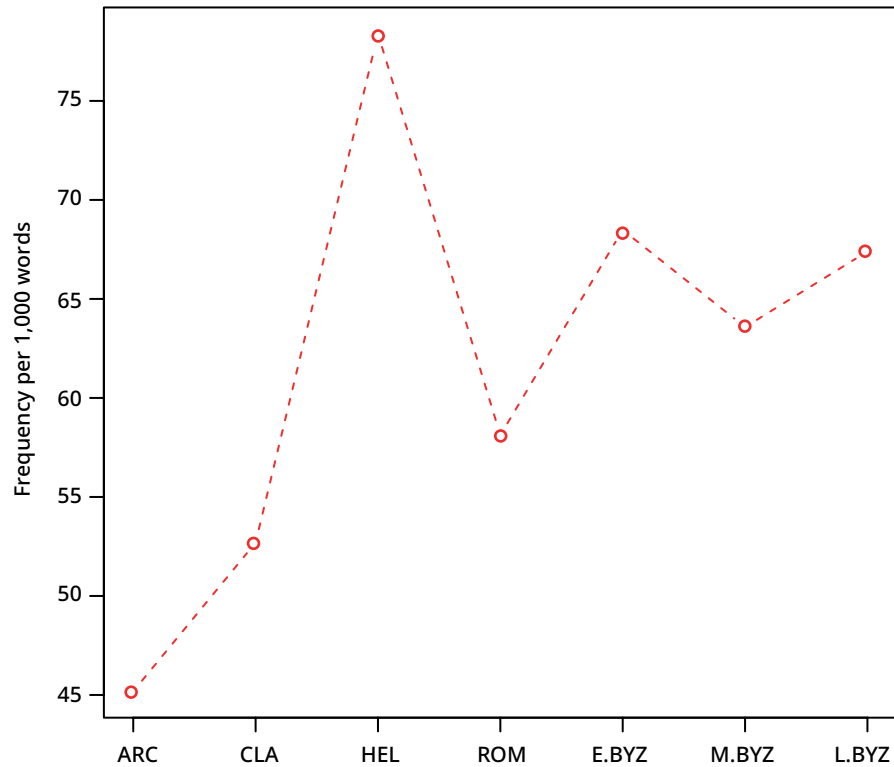**18 prepositions by 7 periods. Median.**

Figure 1. Median of the relative frequencies of each preposition by period (graph: the authors).

Debrunner 1979; Cooper and Georgala 2012; Seržant and Rafiyenko 2021), notwithstanding some increase during Roman times, the Byzantine period and in the New Testament, which is due to the impact of the conservative literary tradition (cf. Horrocks 1997, 49). Another example is the allative meaning 'towards' and the illative meaning 'into'. Both spatial relations could originally be expressed by the bare accusative case in Early Greek. However, already during the Archaic period, these relations tend to be marked periphrastically by the respective prepositions such as *prós* 'to' for the allative and *eis* 'in(to)' for the illative meaning. Yet another example is part-whole relations. These were originally expressed by the (partitive) genitive case, while, starting at the latest from the Hellenistic period on, the prepositions *apó* or *eks* 'from' are used for the same purpose (Nachmanson 1942). Many other examples can be added. As a consequence of these kinds of processes, the frequency of prepositions increases considerably across various periods.

In what follows, we estimate the frequency effects of these types of processes across the periods, authors, genres and for particular prepositions. Instead of looking at particular constructions and contexts, our goal here is to scrutinise frequency trends in a bird's-eye perspective and to draw some general conclusions about the impact of language ideology on the change that in itself is primarily grammar-driven. Methodologically, our approach is somewhat similar to some of the quantitative approaches in stylometry.

We first approach the diachronic variation via the overall relative frequency of prepositions (per 1000 words) across all periods. Figure 1 represents the median frequency of our prepositions per one thousand words:[5]

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5   We choose the median frequency over the mean frequency because it better represents the variation in the data.

What we find is that there is considerable variation across the periods: the curve of expansion of prepositions is obviously not a simple function dependent on the time variable. Thus, the number of prepositions does not steadily increase across all periods as one might have expected: after the steep increase from the Archaic up until the Hellenistic period, there is a substantial breakdown in the Roman period. After this, the expansion of prepositions continues to rise again up into the Late Byzantine period.

This overall picture can be interpreted as follows. First, we observe a steep increase of the frequency of prepositions from the Archaic to the Hellenistic period. This increase in frequency mirrors the grammatical change by which semantic roles of event participants become increasingly marked by prepositions at the cost of the bare cases. This is a purely grammar-driven process of language change that many other Indo-European languages underwent in a similar way (*i.a.* Seržant and Rafiyenko 2021). Crucially and secondly, the breakdown during the Roman period represents a dramatic shift in preferences. Prepositions must have been abandoned from various contexts in which they had already become regular during the Hellenistic period. No doubt, this shift must be due to the rise of the Atticistic ideology, which is generally known to have had an enormous conservative effect on all domains of grammar and lexicon. In our case, it must have led to the abandonment of prepositions from some of their newly established contexts and to their retrograde replacement by case-inflected forms with the aim to imitate earlier, Classical usage. Finally, although it can be observed that the expansion of prepositions sets in after the Roman period again, this expansion is not so pervasive anymore and does not reach the frequency of the Hellenistic period. Given that the relative frequency found in the later Byzantine periods does not reach the peak of the Hellenistic period, it can likely be assumed that the Attistic influence remained in operation even after the Roman period (*i.e.* during the Early, Middle and Late Byzantine periods). This is certainly due to the Attistic ideology that is still alive in the later periods. However, it might also be an indication of the fact that at least some of the puristic norms introduced during the Roman period by a small, highly educated elite penetrated into the linguistic usage of some other social groups, thus gradually transgressing the conscious ideology and turning into the unconscious norm of some speakers (see Peterson *et al.,* this volume). We explore this conventionalisation of the consciously introduced patterns below.

Of course, the overall relative frequencies do not tell us anything about the particular changes of different prepositions and the constructions in which they occurred. Thus, it is certainly possible that particular constructions and prepositional meanings or even particular prepositions, under a closer inspection, might show trends that would deviate from the overall picture observed in figure 1. Since our goal is to capture the overall picture, our method is unavoidably too coarsegrained to capture these specific aspects. Having said this, in order to exclude the possibility that some of these specific factors would skew the overall frequency picture of its period, we rely on median – instead of mean – frequencies.

Now we turn to the breakdown of the Roman period. In order to better understand the specific processes responsible for the breakdown in the Roman period, we zoom in on particular authors. Figure 2 illustrates the relative frequency distributions of particular authors within their periods:

At first glance, we observe a lot of author-specific variation. The sparsest use of prepositions is found in Menander and Aristophanes (less than 40/1000), the highest number of prepositions in Polybius, Diodorus, Archimedes, and the Sep-

Classical	Hellenistic	Roman	Early Byzantine	Middle Byzantine	Late Byzantine
42.89	36.62	41.88	33.0	19.78	15.01

tuagint, all belonging to the Hellenistic period (more than 80/1000). By contrast, Menander (4 BC) has the lowest number of prepositions (30/1000).

Apart from these two extremities, there are interesting tendencies in each period. Thus, the majority of the authors of the Classical period are evenly distributed in the range from ca. 29 to 72 prepositions per thousand words. This indicates that the grammaticality norms for prepositional usage in this period were rather fuzzy. It was acceptable that some authors used almost twice as many prepositions as others, while apparently still remaining within the norms of grammaticality.

Moreover, the periods are not alike with regard to the very degree of the attested variation, which is calculated as the dispersion between the maximum and the minimum frequency for each period (Table 4):[6]

While the later Middle and Late Byzantine periods are characterised by a considerable decrease in variation, the earlier Classical, Hellenistic, Roman and Early Byzantine periods attest a much higher degree of variation. The Classical period has the widest spectrum of frequencies. Side by side with the authors that use extremely few prepositions (*e.g.* Aristophanes, Menander, and Plato), there are authors that use a high number of prepositions (*e.g.* Thucydides, Lysias, and Herodotus). Notably, the authors of the Classical period do not form groups by less vs. more frequent prepositional usage, but are rather evenly distributed within a wide range. This means that a lot of variation was allowed in this period and we cannot speak about one single "grammar of prepositions" that would be common to all authors. Accordingly, we observe no standardisation processes here.

This situation changes in the Hellenistic period quite substantially. In this period, there is less dispersion among the authors, indicating a process of language unification. Most of the authors cluster around very high preposition frequencies (*e.g.* Polybius, Diodorus, Archimedes, the Septuagint, and some others). Crucially, while the Hellenistic period stands out among all periods by the highest median frequency of prepositions (median 82/1000, see Fig. 1), the degree of dispersion, conversely, decreases by more than 10% when compared to the Classical period. In other words, despite an enormous expansion of the use of prepositions during the Hellenistic period (from 53/1000 in the Classical to 82/1000 in the Hellenistic period, see Fig. 1), the grammar of prepositions undergoes a certain degree of unification in this domain. We assume that this effect is due to the emergence of the super-regional variety, Koiné, which had a strong consolidating effect for all registers and varieties of the period.

We now turn to the next, Roman period. One might expect that the same trend towards less variation and a more unified grammar would hold here as well. However, to the contrary, while the median number of prepositions drops abruptly to 58/1000 in the Roman period from 82/1000 in the Hellenistic period (Fig. 1), the degree of dispersion increases from 36.62 in the Hellenistic period to almost 42 (Table 4), reaching the degree of dispersion of the Classical period again. Thus,

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6   The degree of dispersion has been calculated as the difference between the maximum and the minimum relative frequency for each period. For example, the maximum frequency of prepositions is 71.82 per 1000 words in the Classical period, while the minimum is 28.93 per 1000 words. Hence, the dispersion among different authors in this period is 42.89 per 1000 words. Note that we excluded the Archaic period from consideration here because it artificially shows very little dispersion due to the very limited number of texts and authors.

18 prepositions in 70 authors

1_ARC
  Aeschylus
  Hesiodus
  Homerus
2_CLA
  Menander
  Aristophanes
  Plato
  Gorgias
  Isaeus
  Xenophon
  Demosthenes
  Aristoteles et CA
  Aeschines
  Isocrates
  Herodotus
  Lysias
  Thucydides
3_HEL
  Chrysippus
  Dionysius Halicarnassensis
  Nicolaus Damascenus
  Strabo
  Diodorus
  Septuaginta
  Archimedes
  Polybius
4_ROM
  Longus
  Chariton
  Dio Chrysostomus
  Lucianus
  Achilles Tatius
  Xenophon Ephesius
  Heliodorus
  Flavius Philostratus
  Plutarchus
  Cassius Dio
  Flavius Josephus
  Novum Testamentum
  Origenes
  Arrianus
  Appian
5_E.BYZ
  Gregorius Nazianzenus
  Isidorus Pelusiota
  Libanius
  Joannes Chrysostomus
  Theodoretus
  Procopius
  Oribasius
  Ephraem Syrus
  Athanasius
  Joannes Antiochenus
  Basilius Caesariensis
  Cyrillus Alexandrinus
  Eusebius
  Gregorius Nyssenus
  Joannes Malalas
6_M.BYZ
  Symeon Metaphrastes
  Michael Psellus
  Photius
  Joannes Damascenus
  Joannes Zonaras
  Anna Comnena
  Georgius Monachus
  Symeon Logothetes
7_L.BYZ
  Nicephorus Gregoras
  Philotheus Coccinus
  Georgius Pachymeres
  Nicephorus Callistus Xanthopulus
  Eustathius Thessalonicensis
  Joannes VI Cantacuzenus
  Gregorius Palamas
  Gennadius Scholarius

30   40   50   60   70   80   90

Instances per 1,000
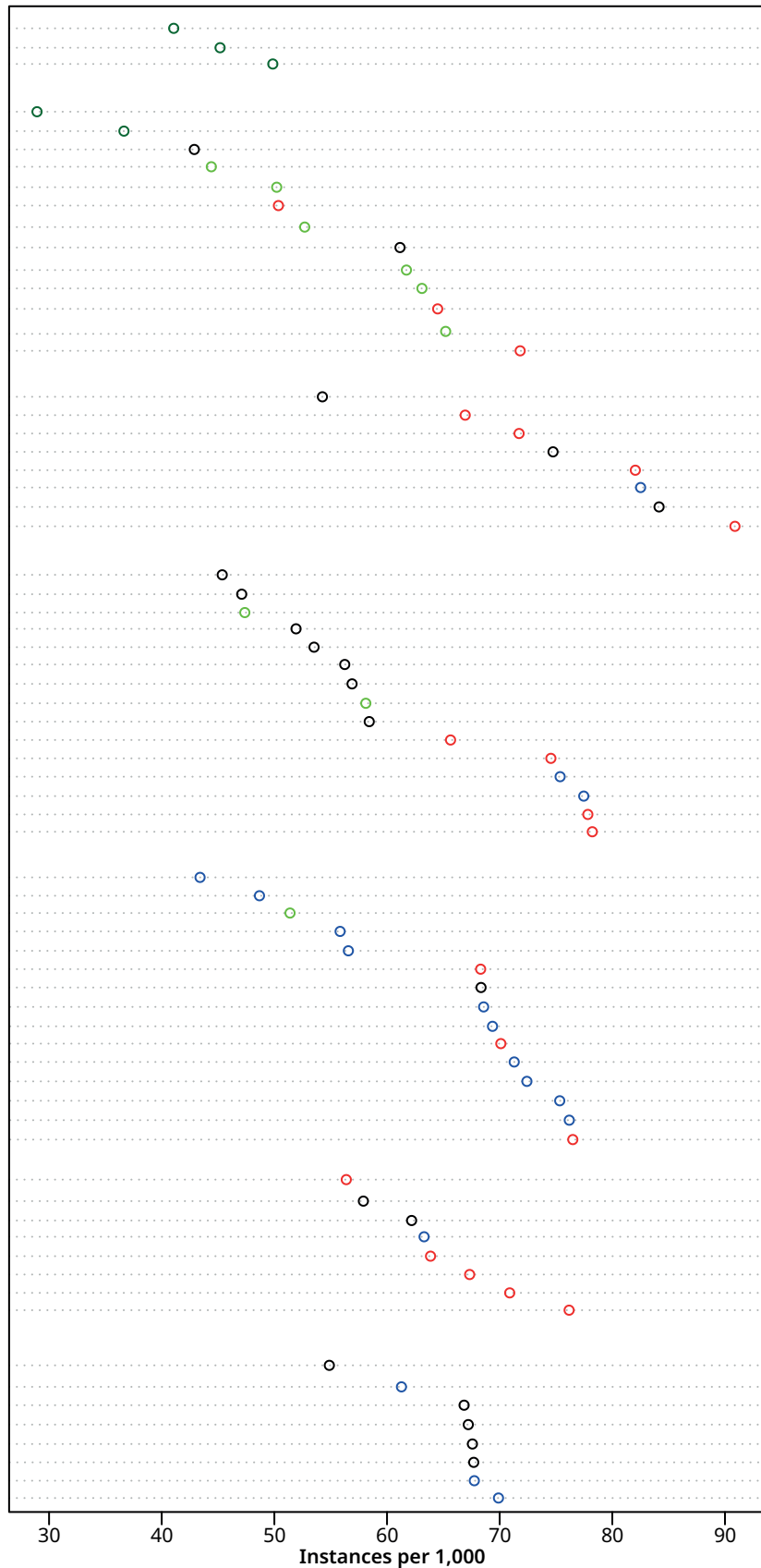
it may appear that the Attistic ideology indeed succeeded in making the language of the Roman period very much similar to that of the Classical period.

Yet, the situation of the Roman period is systematically different from the Classical period. While the Classical period shows no clustering of authors into usage groups, the Roman period exhibits clear-cut groups. Two major groups of authors emerge here: (i) Appianus, Arrianus, Origenes, and the New Testament are consistent in using many prepositions (red and blue dots in Fig. 2), while (ii) Longus, Chariton, Dio Chrysostomus, Lucianus, and some others (black and green dots in Fig. 2) are conservative and employ far fewer prepositions. The first group is much closer to the colloquial language, while the second group is clearly heavily influenced by the Attistic ideology. Accordingly, we refer to the first group as *non-classicising* and to the second group as *classicising*. Notably, the median frequency in the texts of the non-classicising authors is still below the median frequency of the Hellenistic period. This suggests that even the non-classicising group has been influenced by the Attistic ideology as well, albeit to a smaller degree than the classicising group, of course.

We now summarise the evidence from the periods. The high degree of dispersion in the Classical period reveals the actual variation in the language that was undergoing the change from marking semantic roles by bare cases to marking them by prepositions. In other words, the high degree of dispersion in the Classical period is the effect of language change that, expectedly, only gradually affects different speaker layers. By contrast, in the Roman period, the actual diachronic change has been accomplished and the Attistic ideology is responsible for the variation. The high degree of dispersion in the Roman period is due to the selective effect of Atticism. While non-classicising authors and texts (*e.g.* the New Testament) do not depart much from the everyday, colloquial language that primarily relies on the use of prepositions, the classicising authors, by contrast, skew this picture by copying the classical, case-driven patterns and consciously avoiding prepositions. This divide yields the high degree of dispersion that we observe. The classicising authors are responsible for the strong decrease of the median preposition frequency in the Roman period (ca. 58/1000) compared to the Hellenistic period (ca. 82/1000) (Fig. 1). Crucially, the dispersion and variation in frequency is layered here very differently from the Hellenistic period.

Similarly, the distinction between the *classicising* vs. the *non-classicising* authors is observed in the Early Byzantine period as well. Unlike the Classical period, but similar to the Roman period, the Early Byzantine period attests a clear clustering of its authors into groups. Here, too, such authors as Gregorius Nazianzenus, Isidorus Pelusiota, and others group around low preposition frequencies, whereas Johannes Malalas, Gregorius Nyssenus, Eusebius, and others form a group by using many more prepositions.

Within the course of the Early, Middle, and Late Byzantine periods, the frequency of prepositions increases slightly above the level of the Roman period. One thus observes only very little infiltration from the colloquial register, which primarily relies on prepositions (as we know from entirely colloquial texts of the period such as papyri). The median frequency of prepositions remains largely on the same level up to the end of the Byzantine period (Fig. 1). This means that the literary language of these periods develops towards a conventionalised standard and becomes more robust against further influences from the colloquial language.

This is supported by another piece of evidence. The degree of dispersion among authors and texts drastically decreases through the Early, Middle, and Late Byzantine periods from 33 to 15 (Table 4). This means that these periods attest in-

Figure 3 (opposite page). The relative frequencies of 18 prepositions. Genres are color-coded: dark green for poetry, red for historical accounts, blue for religious texts, light green for oratory texts, and black for others (graph: the authors).

18 prepositions in 70 authors

Menander
Aristophanes
Aeschylus
Plato
Gregorius Nazianzenus
Gorgias
Hesiodus
Longus
Chariton
Dio Chrysostomus
Isidorus Pelusiota
Homerus
Isaeus
Xenophon
Libanius
Lucianus
Demosthenes
Achilles Tatius
Chrysippus
Nicephorus Gregoras
Joannes Chrysostomus
Xenophon Ephesius
Symeon Metaphrastes
Theodoretus
Heliodorus
Michael Psellus
Flavius Philostratus
Plutarchus
Aristoteles et CA
Philotheus Coccinus
Aeschines
Photius
Isocrates
Joannes Damascenus
Joannes Zonaras
Herodotus
Lysias
Cassius Dio
Georgius Pachymeres
Dionysius Halicarnassensis
Nicephorus Callistus Xanthopulus
Anna Comnena
Eustathius Thessalonicensis
Joannes VI Cantacuzenus
Gregorius Palamas
Procopius
Oribasius
Ephraem Syrus
Athanasius
Gennadius Scholarius
Joannes Antiochenus
Georgius Monachus
Basilius Caesariensis
Nicolaus Damascenus
Thucydides
Cyrillus Alexandrinus
Flavius Josephus
Strabo
Eusebius
Novum Testamentum
Gregorius Nyssenus
Symeon Logothetes
Joannes Malalas
Origenes
Arrianus
Appian
Diodorus
Septuaginta
Archimedes
Polybius

30   40   50   60   70   80   90

Instances per 1,000
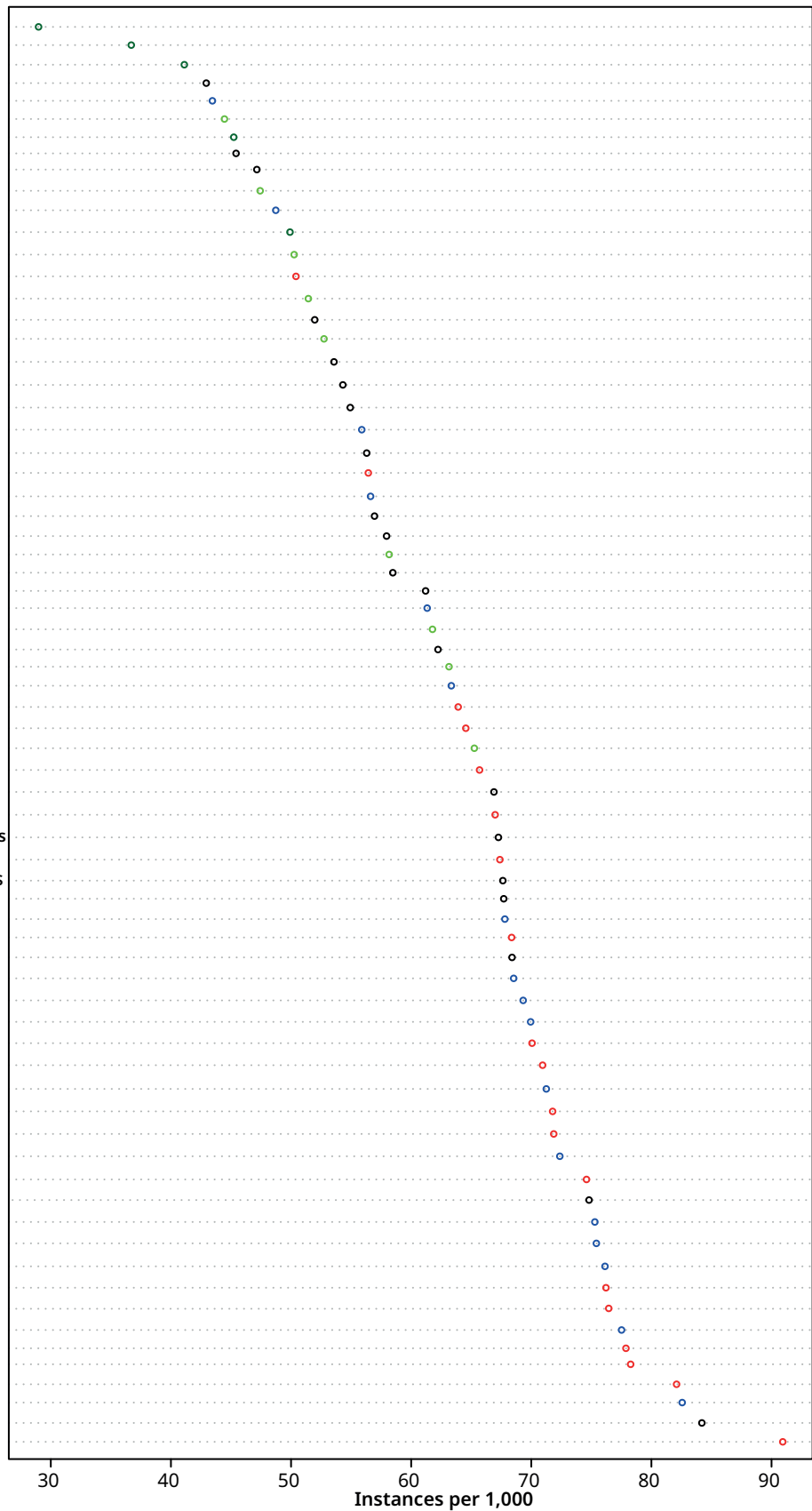
creasingly less variation in prepositional usage despite the fact that the (median) preposition frequency slightly increases. In other words, despite the slight expansion of prepositions from the Early to the Late Byzantine period, we observe a consolidation of usage.

We take these facts as evidence for an ongoing process of standardisation in which the impact of Atticism observed so strongly since the Roman period plays an important role. The use of prepositional patterns stabilises. In effect, authors start exhibiting similar preposition frequencies and come much closer to each other in this respect than it was the case in any of the previous periods. Moreover, while the Roman period was a period of individual approaches to Atticism – something that might be referred to as *creative Atticism* – the Late Byzantine period is rather characterised by what we call *conventionalised Atticism*. Particular Atticistic patterns became the convention and thus the norm of usage by this period.

To conclude, we roughly observe two major periods in the development of prepositions in Ancient Greek. The first period embraces the time span from the Archaic to the Hellenistic period and is characterised by a rapid, grammar-driven expansion of prepositions due to language change. The second period consists of two layers of processes: the grammar-driven expansion continues its operation, but it is at the same time inhibited and re-constrained by multi-layered effects of the Attistic ideology. In effect, the time span from the Roman period to the Late Byzantine period shows only slow expansion but a lot of standardisation with a strong impact of the literary tradition.

The process of standardisation is a highly complicated process that deserves a much larger study than ours. However, our figures allow us to make one important claim about its pathways. We observe that text genres channel the standardisation of prepositional patterns. Figure 3 visualises the effect of the genre:

Thus, authors associated with poetry (dark green in Fig. 3) have much lower preposition frequencies than writers of any other genre. Poetry authors form a consistent group – including the tragedian Aeschylus as well as the comedians Aristophanes or Menander – in that they all score lowest when compared to other authors of the same two periods (the Archaic and Classical periods). Low prepositional usage in poetry has been explained by Herbert W. Smyth (1956, §1656) as an attempt to retain "the more primitive form of expression", although, based on our data, it is not quite clear what kind of primitive form was exactly to be retained by poetry. For example, Menander exhibits a preposition frequency lower than any other author in our corpus, and even lower than what we find in Homer or Hesiod. It is more likely that poetry is subject to linguistic norms that are in part motivated by the conservative – and, possibly, hypercorrect – usage imitating the early tragedians and epic writers. Our evidence supports the view that very early standardisation processes in one particular domain of the language already coined a super-regional variety, namely, the poetry language, which reaches as far back as the Early Classical period (cf. Silk 2009, 16-17).

By contrast, the orators of the Classical period are too heterogeneous and do not form a group (green dots, Fig. 1). Even though they seem to follow the general trend of the Classical period, exhibiting lower preposition frequency than the authors of the later periods, they, however, do not form a consistent group within the Classical period. Some of them tend to be more conservative (Demosthenes, Isaeus, and especially Gorgias), whereas others (Isocrates, Lysias, and Aeschines) align to historians of their time and show higher frequencies.

Historians (red) exhibit the highest frequency in the use of prepositions, followed immediately by religious texts (blue), and are consistently found at the top of their respective periods. For example, Thucydides employs many more prepositions than other authors of the Classical period; the same is true of Polybius in the Hellenistic period and Johannes Malalas in the Early Byzantine period (cf. Horrocks 2010, 100). This suggests that historians are the closest to the colloquial usage and the least amenable to Atticism across all periods.

Furthermore, there are consistent genre-based and chronologically contemporaneous groups of authors that have similar preposition frequencies. One such group that scores low in the use of prepositions is represented by the novelists of the Roman period: Heliodorus, Xenophon Ephesius, Achilles Tatius, Lucianus, Chariton, and Longus. Another such group consists of the Early Byzantine theologians Ephraem Syrus, Athanasius, Basilius Caesariensis, Cyrillus Alexandrinus, Eusebius, and Gregorius Nyssenus.

Finally, the genre of religious texts deserves some attention here. Our evidence suggests that this genre follows the usage of historians until the Early Byzantine period. Thus, the Septuagint is typical for the Hellenistic period by having the same preposition frequency as Diodorus and even a bit less than Polybius. What is more, the frequency of prepositions in the New Testament or in Origenes – one of the most influential figures in early Christian theology, apologetics, and asceticism – is almost equal to the frequencies in the texts of contemporaneous historians such as Appian, Arrian or Flavius Josephus. Similar to historians, the frequency of prepositions in the New Testament decreases as compared to the Septuagint despite the fact that the New Testament is a later text than the Septuagint. This again corresponds to the overall trend of the period: the Roman period generally attests fewer prepositions (Fig. 1).

It is only first in the Early Byzantine period that the authors of religious texts start to split into two groups. On the one hand, the classicising ones, *i.e.*, those that use significantly fewer prepositions than the average of the period (*e.g.* Gregorius Nazianzenus, Isidorus Pelusiota, Joannes Chrysostomus, and Theodoretus) and, on the other hand, the non-classicising, *i.e.*, those that use more prepositions (*e.g.* Gregorius Nyssenus, Eusebius, Cyrillus Alexandrinus, Basilius Casariensis, and others). We conclude that, originally, religious texts presented a homogeneous group which, however, was not necessarily a group of its own, independent from historians. First in the Early Byzantine period, we observe that aspirations towards classicising language sets off religious texts from historical texts.

Zooming in into the frequency levels of particular prepositions

In this section, we focus on the frequency behaviour of particular prepositions from our set in order to see how these were influenced by the Attistic ideology.

As is already known from the literature, the preposition *amphí* disappeared by the Hellenistic period (Fig. 4):

The fact that it reappears in the Roman period and is then used until the Late Byzantine period is certainly only due to the Attistic ideology. This is the only preposition whose frequency and usage is entirely due to the Attistic ideology.

With all other prepositions, only particular usage patterns have been subject to Atticism and, subsequently, the process of standardisation. Attistic influence
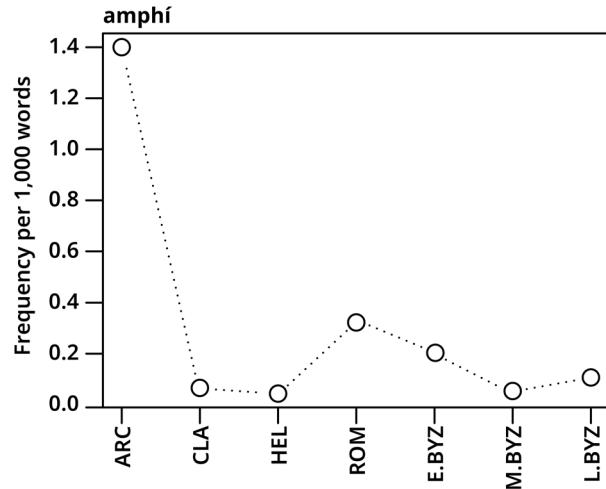
amphí

Figure 4. *amphí* 'around, about' (graph: the authors).

is visible in the trend reversal found in the Roman period as compared to the preceding Hellenistic period.

Consider the frequencies of the prepositions *antí* 'instead of', *pró* 'in front of' or *hypér* 'above, over' across the periods (Fig. 5). The usage frequency of these prepositions during the Hellenistic period decreases considerably (with a decrease of ca. 23-35% as compared to the Classical period). This indicates that particular usage patterns of these prepositions were no longer in use in the Hellenistic period. By contrast, the Roman period continues with the same frequency as the Classical period as if there had been no Hellenistic period in between:

From this, we tentatively conclude that some patterns were "borrowed" from the texts of the Classical period and became part of the learned-language grammar during the Roman period, despite the fact that they already disappeared during the Hellenistic period. As above, we observe that the usage adopted in the Roman period largely continued into the Byzantine periods (except for *hypér*) and thus becomes the standard in writing.

Conversely, the following prepositions increased considerably in frequency from the Classical into the Hellenistic period. In contrast, their frequency considerably diminished in the Roman period, thus almost returning to the frequencies of the Classical period. This means that a number of the Hellenistic usage patterns must have been considered inappropriate in the Atticistic ideology and became dispreferred during the Roman period (Fig. 6):

A similar picture is obtained for *kat*á 'below, along'. Accordingly, we conclude that these prepositions or, more precisely, some of their usages were wiped out by the Attistic ideology and the subsequent process of standardisation.

So far, we have discussed prepositions that are characterised by a switch in their usage trend during the Roman period, either by considerably increasing their usage frequencies (*e.g. amphí*) or decreasing them (*e.g. apó* or *prós*). Interestingly, there are also prepositions that did not undergo any substantial change in their frequencies during the Roman period. For example, *pará* 'at' does not show any considerable changes in frequency (Table 5):

A similar picture is obtained for *epí* 'on' or *eis* 'in'. We may conclude from this that these prepositions, in contrast to the others, have not been subject to Atticism at all or just to a minor degree. Such a selective treatment of grammatical items of the same type is not atypical for the ideological impact.
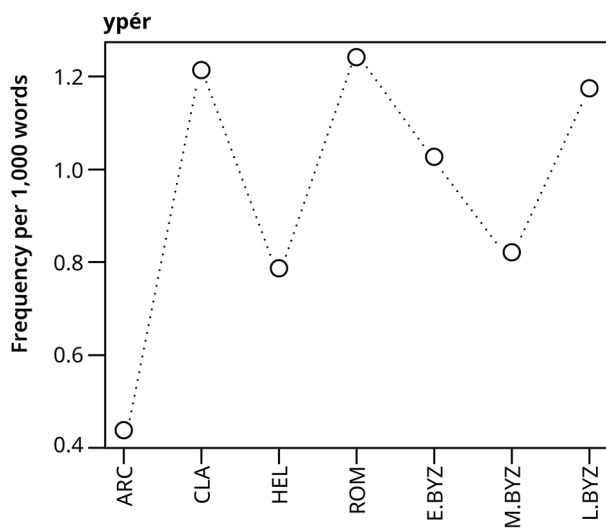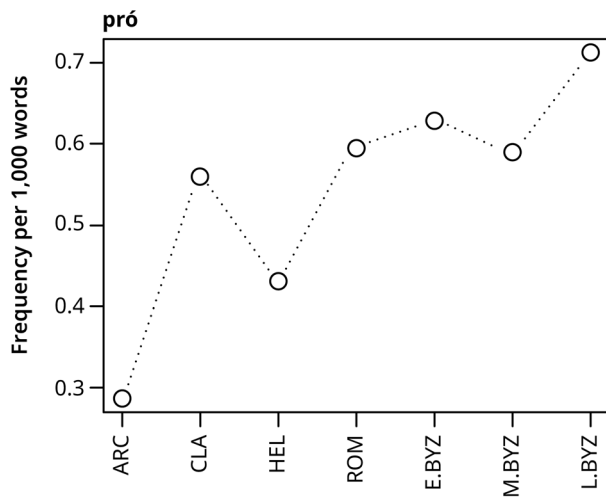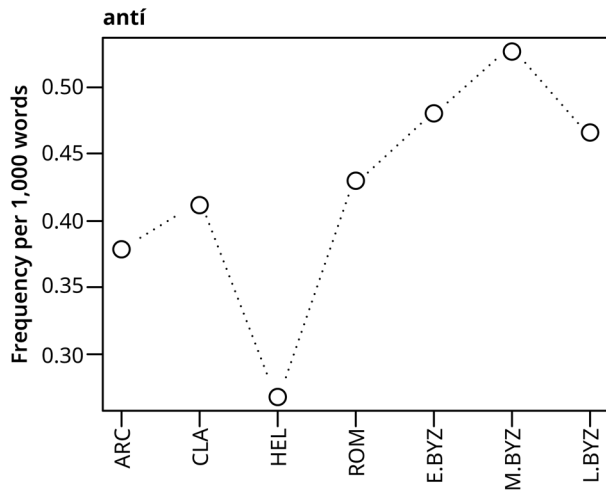
antí

pró

ypér

Figure 5. Relative frequency of *antí* 'instead of', *pró* 'in front of' or *hypér* 'above, over' (graph: the authors).

apó

prós

hypó
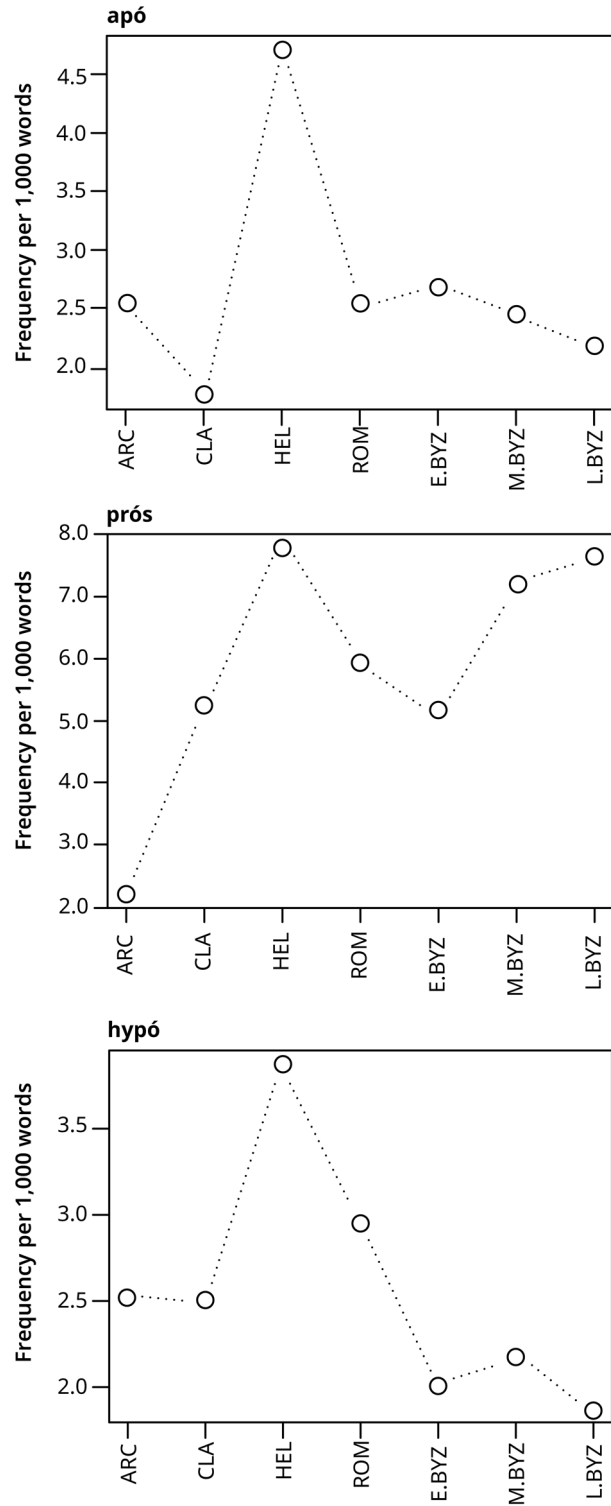

Figure 6. Relative frequency of *apó* 'from', *prós* 'to' and *hypó* 'under, from' (graph: the authors).

	Classical	Hellenistic	Roman	Early Byzantine	Middle Byzantine	Late Byzantine
	2.60	2.95	2.85	2.81	2.75	2.88

Table 5. The relative frequency of *pará* 'at' across the periods (per 1000 words).

Conclusions

Inspired by the quantitative approaches in stylometry, we assumed methodologically that despite different particular histories as well as semantic and constructional developments of particular prepositions, the overall median frequency of all 18 prepositions is a legitimate proxy for the major processes in the grammars of different periods, authors, and genres.

We have shown that the frequency of prepositions in Ancient Greek was not solely determined by language change, *i.e.*, by the grammar-driven development away from encoding semantic roles by inflectional case towards encoding them by means of prepositions. By contrast, we have argued that the ideological impact and standardisation processes heavily influenced the outcome. The Roman period is crucial in this regard (see Fig. 1). We observe that this period considerably skews the trends in the development of prepositions, which we take to be due to the Atticistic linguistic ideology.

More specifically, we distinguished two major developmental steps in the expansion of prepositions in Ancient Greek. First, the time span covering the Archaic, the Classical and the Hellenistic periods is characterised by the grammar-driven expansion of prepositional patterns across various domains. By the Hellenistic period, this process is very much advanced at the cost of the bare case. This is observed by the steady increase of the corpus frequency. Moreover, we found that the Hellenistic period is characterised by a lower degree of dispersion among its writers than the Classical period. It is during the Hellenistic period that Koiné emerged into the superregional variety, which, we assume, had a negative effect on the degree of variation in this period.

The second step, by contrast, is a development of a different sort. It starts during the Roman period as a creative ideologisation in favour of the "ideals" of the Archaic and Classical periods and leads to a great deal of variation among the writers of the Roman period. Eventually, particular Attistic patterns became conventionalised in the writings of the Byzantine periods – something that we see in the decrease of the dispersion factor. This development indicates that the norms had been developed and accepted over a wider social layer than the original one. Thus, the original trend towards the expansion of prepositional marking is reversed in the Roman period. There is a considerable decrease in the overall corpus frequency of prepositions as compared to the chronologically earlier Hellenistic period, which is then gradually fixed in the Byzantine periods only to a certain extent. More specifically, while some few prepositions that became rare or even extinct in the Hellenistic period are "restored" in the Roman period, most prepositions decreased their frequency in the Roman period when compared to the Hellenistic period and thereby acquired frequencies that were close to the original frequencies of the Classical period. This is because a number of prepositional usage patterns of the Hellenistic period were retrogradely abandoned and replaced by bare cases during the Roman period.

Moreover, we found that the frequencies are not solely determined by the grammar-driven language change or by the language ideology, but that genres channel the expansion of prepositional patterns. Thus, different genres considerably deviate from each other in the frequency of prepositions. Historians and early religious texts are the most progressive and less amenable to ideologising the earlier periods. By contrast, writers of poetry and orators are much more conservative, more resistant to language change, and tend to imitate the earlier language layers more faithfully.

Interestingly, we also found that the Attistic ideology was apparently not concerned with all prepositions because some of them do not show any considerable effect of the Roman period on their frequencies.

We approached the impact of the Atticistic ideology on the grammar of prepositions with a bird's-eye view without concentrating on particular patterns and occurrences. Our aim was to quantitatively evaluate the overall ideological impact on Postclassical writings and to uncover the major pathways here. The very sociolinguistic mechanisms of these pathways have been left out here for reasons of space, see, however, Alexandra Georgakopoulou and Michael Silk, eds., (2009) for a collection of the relevant studies, *i.a.*, Claudia Strobel (2009).

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Connectivity Matters!

Social, Environmental and Cultural Connectivity in Past Societies

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Preface of the series editors

As the outcome of overarching, interdisciplinary scientific research efforts within the Excellence Cluster 'ROOTS – Social, Environmental and Cultural Connectivity in Past Societies' at Kiel University, we are pleased to introduce the second volume of the publication series **ROOTS Studies**. This book series of the Cluster of Excellence ROOTS addresses social, environmental, and cultural phenomena as well as processes of past human development in light of the key concept of "connectivity" and presents scientific research proceeding from the implementation of individual and cross-disciplinary projects. The results of specific research topics and themes across various formats, including monographs, edited volumes/proceedings and data collections, are the backbone of this book series. The published volumes serve as a mirror of the coordinated concern of ROOTS researchers and their partners, who explore the human-environmental relationship over a plurality of spatial and temporal scales within divergent scientific disciplines. The associated research challenges revolve around the premise that humans and environments have interwoven roots, which reciprocally influence each other, stemming from and yielding connectivities that can be identified and juxtaposed against current social issues and crises. The highly dynamic research agenda of the ROOTS cluster, its diverse subclusters and state of the art research set the stage for particularly fascinating results.

The new book in the series is a presentation of the basic concept of social, environmental and cultural connectivity in past societies, as embodied in a diversity of disciplines in the Cluster of Excellence ROOTS. Thus, rather pragmatically

driven ideas of socio-environmental connectivities can be found at the beginning, which formed the basis of the Cluster of Excellence in its research application. A discussion of the fluidness of the term connectivity and the applicability of the concept follow in another contribution. With various case and concept studies, we then advance into the perspectives that develop from the new interdisciplinary interaction. These include both rarely considered dependencies between nomadic and urban lifestyles, and aspects of water supply and water features, which represent an area of connectivity between the environment and agglomerated human settlement structures. In addition, diachronic aspects are presented in various studies on the role of connectivities in the development of social inequality, the use of fortification, waste behaviour, or the creation of linguistic features in written media. The contribution on linguistics and archaeology basically comments on the question of interdisciplinary connectivity of the two disciplines and the resulting perspectives. In sum, facets of connectivity research are revealed that are also being investigated in numerous other disciplines with further results in the Kiel Excellence Cluster ROOTS.

The editors of the ROOTS Studies series would like to take the opportunity to thank those colleagues involved in the successful realisation of the second volume. We are very grateful for the detailed and well-directed work of the ROOTS publication team. Specifically, we thank Andrea Ricci for his steady support and coordination efforts during the publication process, Tine Pape for the preparation of the numerous figures and the cover design and Eileen Küçükkaraca for scientific editing. Moreover, we are indebted to the peer reviewers and our partners at Sidestone Press, Karsten Wentink, Corné van Woerdekom and Eric van den Bandt, for their support and their commitment to this publication.

Kiel, March 2022
Lutz Käppel, Johannes Müller, Wolfgang Rabbel

Contents

Preface of the volume editor

In the fast-paced development of scientific methodology and theory, there are hardly any constants left, particularly in the humanities, which have existed and been recognised as viable concepts over many decades. Moreover, there is a diversity of the various scientific schools, distributed regionally and continentally, which develop ideas and concepts partly independent of each other. This fundamental situation has not changed much in light of the dominance of the English-speaking language in the "Western world".

It seems all the more surprising to me that the concept of connectivity not only necessarily tears down disciplinary boundaries. But that here, in particular, by linking many facetted aspects from ecological and climate spheres, and from cultural and social aspects of societies, they can be combined to form a basic element through which the interaction in and between human societies and resilient behaviour towards the environment can be experienced and explained – in the best case with sustainable consequences.

Connectivity is something that is comprised of the basic elements of human action, which includes, among other things, sharing and competition. It is something that establishes the ecological parameters of societies as determining factors for social developments, but also vice versa. At the same time, traditional terminologies dissolve, e.g., the concepts 'rural' and 'urban' are inseparable, just as the natural and cultural environments or even matter and spirit.

In this respect, 'connectivities' constitutes an exciting topic, the academic localisation of which is attempted in this book. We would like to thank the authors

Kiel, March 2022
Johannes Müller