Cardinal Numerals

Topics in English Linguistics
67

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De Gruyter Mouton

Cardinal Numerals

Old English from a Cross-Linguistic Perspective

by

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ISBN 978-3-11-022034-6
e-ISBN 978-3-11-022035-3
ISSN 1434-3452

Library of Congress Cataloging-in-Publication Data

Mengden, Ferdinand von.
Cardinal Numerals : Old English from a cross-linguistic perspective / by Ferdinand von Mengden.
p. cm. – (Topics in English linguistics ; 67)
Includes bibliographical references and index.
ISBN 978-3-11-022034-6 (hardcover : alk. paper)
1. English language – Old English, ca. 450–1100 – Numerals. 2. Cardinal numbers. 3. Numeration. 4. Comparative linguistics. 5. Historical linguistics. I. Title.
PE179.M46 2010
429'.5–dc22
2009051311

Bibliographic information published by the Deutsche Nationalbibliothek

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available in the Internet at http://dnb.d-nb.de.

Cover image: Brian Stablyk/Photographer's Choice RF/Getty Images
Printing: Hubert & Co. GmbH & Co. KG, Göttingen
∞ Printed on acid-free paper

Printed in Germany

www.degruyter.com

Acknowledgements

It was Klaus Dietz who initially made the suggestion to me that the linguistic study of numerals would prove to be a rewarding field. I owe him therefore greatest thanks, not only for the initial impetus for this study, but also for the excellent advice and the invaluable criticism which he provided throughout.

I would also like to express my gratitude to Elizabeth Traugott, not only for including this study in the series *Topics in English Linguistics*, but also for her criticism and her most helpful comments and suggestions on the text's draft versions. Moreover, I am most indebted to Katerina Stathi for her constructive criticism: thanks to her keen eye for detail, a number of flaws and foibles could be prevented from making their way from the pre-final manuscript into the printed version.

Numerous other friends and colleagues supported me with fruitful suggestions, encouragement and critical comments and provided their assistance in various other ways throughout the duration of this project. Among them Renate Bauer, Thomas Berg, Guy Deutscher, Volker Gast, Kai Glason, Daniel Hole, Christoph Jehlicka, Andrew James Johnston, Beth Martin, Hans Sauer, Calvin Scott, Casey John Servais, Judith Stemmann, Stefan Thim, and Ellen Westphal all deserve particular mention. I would also like to express my special gratitude to Rosalind Meistermann for her continuous encouragement and her unreserved support. Finally, I would like to thank my parents, Regine and Hans-Jürgen von Mengden, for having so confidently supported my commitment to a field of academic endeavour far beyond the sphere of their own personal and professional interests.

My heartfelt thanks go to everyone mentioned above: without their support, this book would have been much less than it is now. All remaining errors and shortcomings that it may contain now remain my sole responsibility.

Ferdinand von Mengden
Berlin, November 2009

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Abbreviations

General

DOE	*Dictionary of Old English*
fn.	footnote
L	Limit number of a numeral system
MEAS	unit of measurement
MED	*Middle English Dictionary*
ms.	manuscript(s)
n.	note
NP	noun phrase
NUM	cardinal numeral
OE	Old English
OEC	*Old English Corpus*
OED	*Oxford English Dictionary*
PDE	Present-day English
PIE	proto-Indo-European
VP	verb phrase

Key to morpheme-by-morpheme glosses

In Chapter I, the morpheme-to-morpheme glosses are usually employed to indicate the underlying arithmetical operations of complex numerals. In order to avoid confusion between the morpheme boundary marker "-" and the arithmetical operator "–", morpheme boundaries are marked only in the Old English original, but not in the gloss. In Chapters II and III , morpheme boundaries will be marked, according to the convention, in both the original and the gloss. Generally the morpheme-to-morpheme glosses follow the conventions suggested by the Leipzig Glossing Rules.

1	first person
2	second person
3	third person
ACC	accusative
C	common gender form
CIRC	circumfix
CLF	classifier
DAT	dative
DEM	demonstrative pronoun
DET	determiner
DU	dual
F	feminine
GEN	genitive
IND	indicative
INF	infinitive
INS	instrumental
M	masculine
N	neuter
NEG	negation
NMLS	nominaliser
NOM	nominative
OBL	oblique case
ORD	ordinal numeral
PL	plural
PPRN	personal pronoun
PREP	preposition
PRS	present tense
PST	past tense

PTCP	participle	SG	singular
REL	relative	SBJV	subjunctive
RPRN	reflexive pronoun		

Manuscript sigla

Addit. 47967	London, British Library, Cotton collection, ms. Addit. 47967.
CCCC	Cambridge, Corpus Christi College [followed by ms. siglum]
Julius A.x	London, British Library, Cotton collection, ms. Julius A.x.
Otho B.xi	London, British Library, Cotton collection, ms. Otho B.xi
Tiberius A.iii	London, British Library, Cotton collection, ms. Tiberius A.iii.
Tiberius B.i	London, British Library, Cotton collection, ms. Tiberius B.i.

Introduction

Cardinal numerals are not missing in any grammar or textbook of Old English nor in numerous other contributions to the study of the language. Yet, the relevant sections in the handbooks are all short and, it seems, numerals and their system have rarely been examined with closer scrutiny. In this respect, a reference grammar of Old English does not differ much from one of any other language. The scarce attention these expressions seem to receive from grammarians or linguists does not correspond with their frequency in the every-day use of a language.

This discrepancy can perhaps be accounted for by the fact that the semantics of cardinal numerals seem quite plain and their use rather natural. As speakers, we probably count or quantify things several times a day without thinking about the mechanisms underlying these activities. Also, from a cross-linguistic perspective, no other class of lexemes is semantically as uniform as that of cardinal numerals. The notion of 'number' is independent of the cultural diversity amongst language communities and hence universal. In contrast to any other class of expressions, even to kinship or colour terms, a cardinal numeral always has a one-to-one equivalent in another language. The meaning of a cardinal numeral does not require much explanation in second language teaching and the skills of translators are hardly ever challenged by it. Perhaps the perception of the numerals and the numeral system of one's own language as an every-day phenomenon, along with the intuition that the semantics of numerals are quite evident, make it appear rather trivial to the (historical) grammarian to take a closer look at the numeral system of a language.

Knowing how to count is a capacity which is obviously located on a different level of human comprehension than understanding a Case system or a Tense system. But just as a Case system cannot be reduced to the distinction of agent and patient or a Tense system to the notions 'past' and 'present', we may well ask for a precise definition of the relation between every-day activities or processes like counting or employing numbers and their linguistic instantiations. This in turn leads us to the question of whether there is a connection between some of the grammatical properties particular to cardinal numerals and the domain of counting and calculating.

In the same way as many linguists try to account for linguistic phenomena by (alleged or proven) patterns of human cognition, we may well ask whether a non-linguistic phenomenon (or rather, a model about it) contributes to approaching a linguistic phenomenon. So, if numerals obviously have to do with numbers, a very basic question can be employed as a plausible way of entering into the study of numerals: what is (a) number? Being faced with this question, we see that employing a concept ubiquitous in our every-day lives does not necessarily mean that we can *explain* the concept right away. A possible approach to defining 'number' – one of which I think it is most beneficial for studying linguistic numerals – will be presented in § I.2 and will provide a basis for most issues discussed in this study. Several follow-up questions immediately arise from the question about the status of 'numbers'. What is the relation between 'numbers' and 'numerals'? We will see that numerals are best explained as instantiations of numbers, that is, as a set of tools that we employ if we wish to use numbers for specifying the size of a set. We will see, furthermore, that numerals can only be used in this function if they are elements of a *numeral system*. That is, one single numeral can only perform its function if it is organised around a larger set of other numerals. The expression *four* could not denote the property of 'containing four elements' if the same language did not also provide neighbouring expressions like *three* or *five*; cf. § I.2.2). Thus numerals necessarily constitute a numeral system. But how exactly do we define a numeral system? We know that the notion of a 'decimal system' has something to do with the fact that, in many numeral systems, '10' marks something like a turning point. Intuitively, we might say that '10' is the first number to employ two digits and its first power, '100', the first to employ three. This is true only for our written numerals, the Hindu-Arabic symbols that we use for writing numbers, but it is *not* true for any linguistic numeral system: in English, the expression *ten* follows *nine*, but both expressions consist of only one symbol (or of only one morpheme, for that matter). When speaking, we do not say something like *one-zero*. Likewise, and differing from the written symbol ⟨100⟩, the expression *hundred* is a morphologically simple expression and does not contain several digits. Thus linguistic numeral systems are different in some respect and yet they are used for the very same purpose as, say, the Hindu-Arabic notation. (Cf. particularly § I.3.4.3, where this point will be discussed.)

Of course, it is not the task of a linguist or a grammarian to explain numbers or mathematics. Yet, if we wish to approach this class of expressions as a linguistic phenomenon, the question of what exactly the relation between a '(cardinal) numeral', a 'number' and the size of a set ('cardinality') is will have to be raised. This is irrespective of the fact that, as speakers, we use numerals with ease and quite successfully yet never reflect on what exactly we are doing when we *quantify a set* and, moreover, how we are doing this or by means of which method. This complex of questions will be addressed in Chapter I. It will be shown that clarifying some basics about the status of 'numbers' will bring about a promising basis for understanding many features of numerals – features which have so far led linguists to conceive of numerals as a hybrid class that can be defined semantically but not morphosyntactically. Addressing fundamental questions about quantification by numbers will enable us to define a numeral system as a particular subsystem of a language (with, as we may view it, an internal grammar) and to describe the fundamental characteristics of numeral systems of natural languages. Understanding some general features of linguistic numeral systems will, in turn, help us to account for language-specific peculiarities of numerals.

Whereas numerals seem to be approachable more easily with respect to their semantics, difficulties seem to arise if we try to examine cardinal numerals in other domains of linguistic description. With respect to their inflection and their syntactic behaviour, cardinal numerals seem to display the most heterogeneous features. For instance, not only from a cross-linguistic point of view but even within a particular language, some cardinal numerals often follow different inflectional patterns than others; cf. e.g. GREENBERG (2000). With respect to their syntactic properties, cardinal numerals are similarly held to behave inconsistently both across languages and within a given language. They seem to be inscrutable to linguists at times, for instance when it comes to assigning them to a particular word class. The statement that higher valued numerals universally show more noun-like properties than lower valued numerals (CORBETT 1978a, 1978b; cf. § V.2.3) is one of the most frequently quoted generalisations on numerals. But a closer look will reveal that this implicational statement expresses a mere chance coincidence between the numerical value and the morphosyntactic features of an expression. Given that languages, and hence numeral systems of genetically unrelated languages, develop independently, I believe that formulating the implication as such should only be the first step. It should be equally essential to take the consequential second step, which is to find the reason for the apparent connection between the numerical value and the presence or absence of noun-like morphosyntactic features in the use of the respective numeral expression.

Accordingly, one question we will have to raise is that of *why* higher valued numerals *seem* more noun-like than other numerals. The explanations I will propose (particularly in Chapter V) will be based on the assumption that the more noun-like appearance of higher numerals can be accounted for by properties that are inherently characteristic of numerals (rather than of nouns). I will argue that significant clues to get to the bottom of the problem may be found in the natural way in which numeral systems emerge and, subsequently, develop into a more complex system (cf. §§ II.7 and V.2.5.1). The fact that this development, to a considerable extent, runs parallel among genetically unrelated languages – and, accordingly, the resulting properties of numerals show parallels across languages – is, in turn, due to the universally uniform semantic content of cardinal numerals. Thus one general claim of this study is that the difficulties with respect to the morphosyntactic properties of numerals and, as a related question, to the word class character of numerals can be overcome.

Hence, the study of the processes that lead to such correlations is equally significant to finding implicational generalisations on numerals in natural languages. And, if we want to learn more about the attested (or reconstructable) long-term changes of numeral systems, cross-linguistic breadth and historical depth will be equally important. While deliberately taking both the dimensions of typology and history into consideration, this study is based on and focuses on historical data of one particular language. One of the advantages of this approach is that both a language-specific description (Old English) can be carried out and, on this basis, a long-term perspective (from proto-Indo-European via Old English to Present-day English) can at least be sketched to a sufficient degree. In addition to contributing to the study of the Old English language, a comprehensive language-specific description of a numeral system also serves the purpose of assessing the theoretical model set up in Chapter I. Long-term diachronic considerations – here with a necessary bias towards Indo-European and Germanic – provide evidence for the individual steps in the emergence and the growth of numeral systems (outlined in §§ II.7 and V.2.5.1; cf. also VON MENGDEN 2008), which in turn explains not only the variation in the morphosyntactic properties of numerals (see above), but also the general structure of numeral systems and the existence of such morphemes like *-teen* and *-ty* in Present-day English (cf. §§ I.5.3.2, II.4.3, II.7.2, and Chapter V).

The Old English language is, in various respects, a perfect candidate for the task of describing a numeral system so that more general, cross-linguistic implications can be made. Generally, Old English is a typical representative of both European and Indo-European languages. Its grammar reflects an intermediate stage between the inflecting Indo-European proto-language and the analytic character of Present-day English. Moreover, of any Early Medieval language of Europe – with the exception of Medieval Latin – Old English has by far the greatest corpus of preserved text documents comprising various genres over a period of several centuries. Finally, and most importantly with respect to numerals, the numeral system of Old English is basically similar to that of other European and Indo-European languages but at the same time shows a number of features which significantly deviate from what we are familiar with from the perspective of today's English. It is surprising, therefore, that Old English numerals have been neglected in the general linguistic literature on numerals and, likewise, that numerals are a rather neglected category in the study of Old English.

To give an example of a typologically highly unusual feature of the Old English numeral system: the Anglo-Saxons have an expression for '100' in their language just like any other European language. When counting above '100', however, they do not use it in the first place, but continue to count with multiples of '10', as if we said, 'eighty', 'ninety', 'ten-ty', 'eleven-ty', 'twelve-ty'. Only from '130' onwards do they employ the base '100' and continue with 'hundred and thirty', 'hundred and forty' and so on (cf. § II.4.3.3). This phenomenon of overrunning a numerical base has been mentioned in some typological studies on numerals with reference to other languages (GREENBERG 1978: 271, referring to Keres; COMRIE 1999: 732, mentioning Polabian), but the same phenomenon in Old English, although stable and well-attested, has gone completely unnoticed in studies on numerals and numeral systems with a cross-linguistic approach.

On the other hand, scholars interested in the study of the ancient Germanic languages have made numerous attempts to explain the etymologies of the respective expressions used for counting up to '120' (cf., e.g., SZEMERÉNYI 1960; BAMMESBERGER 1986), but there has never been any attempt to discuss the phenomenon of the Germanic languages in a more general, cross-linguistic context. Indeed, language-specific contributions concerned with these Germanic numerals seem to have completely ignored what typologists say about similar phenomena in other languages. The peculiar way in which the counting-sequence of the Anglo-Saxons is structured between '99' and '129' may serve as one example out of several for the way in which researchers of Germanic or Old English and general linguists have analysed corresponding phenomena completely independently of each other.

The grammatical description of Old English has freed itself from traditional approaches influenced by the description of the classical languages only rather recently with the emergence of electronic corpora. Yet much of what we find on numerals of either Old English or the ancient Germanic languages draws, to a large degree, on the framework of classical grammar. Neogrammarian studies on cardinal numerals have, in the tradition of their time, always focused on their phonology and morphology and on the history of particular numerals. Linguists from that earlier period examined the etymologies of numerals (e.g. VAN HELTEN 1905/06) or they provided lists of instances of particular forms and uses of numerals (e.g. FRICKE 1886). But even more recent studies hardly went any further. The very comprehensive contribution by

ROSS/BERNS (1992) provides a useful overview of the developments of all diatopic and diachronic varieties of the Germanic branch of Indo-European, but their study still focuses primarily on etymological problems, whereas they treat other linguistic aspects, the use of inflection or syntactic constructions for instance, only in the context of the history of particular numeral forms.

Yet if we set such a language-specific analysis into a cross-linguistic context, i.e. if, in our description of the numerals of one particular language, we take into account the possible strategies which can be employed for the formation of numeral expressions, we will not only operate on a safer theoretical basis, but we will also be able to gain valuable insights for the reconstruction of pre-historic stages of languages and their respective numeral systems. In my view, this context has been widely ignored in diachronic studies on numerals. I would argue, however, that an understanding of cross-linguistic features of both numeral expressions and numeral systems is in many respects a prerequisite for the historical study of numerals. Eugenio LUJÁN – one of the few historical linguists working on numerals who includes both system and reconstruction (or both typology and history) as equally important – writes (LUJÁN 1999: 203):

> Traditionally, etymological work on Indo-European numerals lacked general scope, in the sense that it used to deal with each numeral separately, without taking into account what happens to be the most important characteristic of numeral systems: the fact that "the value of each cardinal number corresponds to its order in counting", as Stampe (1977: 596) stated it. In other words, in order to account for a numeral system we have to bear in mind that the concept of "series" (or "sequence", as Hurford (1987: 86 ff.), prefers to refer to it) is basic. It is in this sense that most of the work done on Indo-European numerals is insufficient. When concentrating on just one numeral, a given etymology may seem to be possible and the reasoning that has led to it, convincing. The problem is that, when we try to bring together the etymologies proposed for different numerals, in most cases we have to accept that the Indo-Europeans amused themselves by inventing a numeral system with no consistency at all, or else – which is more likely – we begin to suspect that the etymologies are not so convincing as we thought.

While arguing that the study of the history and pre-history of a given language requires the study of what is typologically possible and what is unlikely, I do not intend to say that the study of diachronic developments in language (or in a particular language) is secondary. In fact, the benefit will certainly be mutual.

Especially in the context of numerals and numeral systems, quite a number of substantial contributions have already been made on the origins and the evolution of the number concept in human culture and its representation in language; cf., e.g., IFRAH (1981). It is assumed that human counting was originally carried out by means of gestures. Particular points on the human body, to which somebody pointed when counting, served to refer to particular cardinalities. Originally, the expression for that body part accompanied the gesture until, at a next stage, the linguistic expression became the primary numerical tool (cf. § I.2.2) and, eventually, the accompanying gesture was no longer felt necessary. Not necessary does, however, not mean extinct: whether unconsciously or not, we still often show the relevant number of fingers as an accompanying gesture when we specify numbers.

Also, a number of studies have approached numerals from the perspective of the cognitive foundations of number concepts and of numeral systems; cf. e.g. HURFORD (1987), WIESE (2003). Central questions raised in these contributions have been how an individual perceives cardinalities or how an infant acquires the capability of operating with numbers. There are a number of phenomena particular to the word class numeral for which the area of human cognition seems to be the most promising source for explanations, such as for instance the special status that the lowest numeral expressions have in many languages (§ V.2.4; cf. HURFORD 2001) or the sequential ordering of numerals in virtually all languages (§§ I.2.2 and I.4.2).

In the times when transformational grammar was most successful, a number of formal models for the description of numeral systems have been suggested; cf. e.g. HURFORD (1975) or the contributions in BRANDT CORSTIUS (1968). Likewise, universal properties of numerals and numeral systems have been identified on the basis of large language samples – most of all by Joseph GREENBERG who provided a list of 54 empirically founded generalisations about numerals (GREENBERG 1978).

The present study will try to integrate these approaches – linguistic typology, the connection between human cognition and language, and language history – into one framework for the study of numerals. Each of these areas of study has its value for explaining phenomena related with numerals. Thus in order to understand cardinal numerals in their entirety, all these areas need to be looked at and the ways in which these areas complement each other should be examined and defined.

In light of the points raised above, the aim of the present study is, first of all, to contribute to the grammatical description of the Old English language by providing a detailed analysis of the Old English numeral system and of the properties of the respective expressions. However, the analyses of this study are at the same time intended to contribute to the linguistic study of numerals in a more general, cross-linguistic context.

As a preliminary step, universal features of numeral systems will be discussed in view of the extent to which they are relevant for an analysis of the numeral system of Old English. Chapter I will also provide a definition of what constitutes a numeral system and, hence, what a numeral is. This seems necessary since there are a number of expressions which are classed undisputedly as 'numerals', while there are also expressions which sometimes have been treated under the label 'numeral' even though this categorisation cannot be maintained once we define 'cardinal numeral' in a precise way. For instance, in most grammars or handbooks of Old English, the expression *BA* 'both' has been categorised as a numeral without distinguishing it from the cardinal *TWA* '2'. The two expressions, however, have quite a different distribution. Moreover, while the primary use of a numeral '2' is to specify the cardinality of a set (containing two elements), the use of an expression like 'both' requires that the cardinality '2' is a given piece of information in the discourse, i.e. that the cardinality '2' has already been specified. Or, in other studies, not necessarily those concerned with Old English, expressions like *dozen* are treated in the same way as *twelve* without any further distinction. GREENBERG (2000: 771) has pointed out that a difference needs to be drawn between genuine numerals and other expressions which specify the cardinality of a set in a likewise unambiguous way. However, a clear definition of this difference, and hence a clear definition of how to draw a line between cardinal numerals and other number expressions, has, to my knowledge, not been provided so far (cf. especially § I.4).

The framework thus developed will then allow us to commence the language-specific description of the numeral system of Old English (especially Chapters II and III). In Chapter II, we will discuss the characteristic features of the Old English numeral system and of the morphological (and syntactic) strategies employed to generate numeral expressions in Old English. Chapter III will discuss more detailed phenomena particularly concerning complex numeral expressions in Old English. At the same time, the issues raised in Chapter III will contribute further to the understanding of numeral systems of natural languages.

In Chapter IV, we will then examine the morphosyntactic properties of cardinal numerals of Old English. The focus will be on the constructions in which cardinal numerals may occur and on the respective functions which they may exhibit in the particular constructions. The underlying assumption is that the key function of numerals is quantification, which, in the context of the morphosyntactic interaction between numeral and noun, I take to be the numerically-specific modification of the extensional reference of the noun phrase. The main point which will be shown in this context is that this function, quantification, can be performed in different types of constructions and that the choice of the relevant construction follows particular, well-identifiable constraints on several linguistic levels. But secondary functions may well arise from this main purpose of numerals as for instance that of anaphoric reference (cf. §§ IV.4.3.2–4).

Chapter V will set the results of our analysis into a cross-linguistic context. As already alluded to above, I will basically argue in Chapter V that cardinal numerals can be considered an independent lexical class not only because of their cross-linguistically uniform semantics, but also because their morphosyntactic properties (i.e. inflectional behaviour, syntactic distribution and the underlying constraints) follow relatively consistent patterns within and across languages. The main argument supporting this claim will be that variation in the morphosyntactic properties of numerals should not be viewed as a sign of the hybridity of numerals, but that this variation can be accounted for by the way numeral systems are structured and, as already mentioned, by the way these structures develop.

In line with the above assumption – that the study of numerals of an ancient language needs to take cross-linguistic patterns into account – Chapters I and V, but also a few parts of Chapter III – will contain more general discussions on numerals in which Old English does not play a central role. The language-specific description will be in the focus of Chapters II to IV. Another division, although necessarily not a clear-cut one, can be made between the study of the numeral system and the study of the grammatical properties of numerals: Chapters I to III will deal with the numeral system, Chapters IV and V with morphosyntactic properties of numerals. Thus, Chapters I and V correspond largely to what GIL (2001: 1275a) refers to, respectively, as the 'internal' and 'external' typology of quantification. They will be of particular interest also for those readers whose key interest is not the Old English language but who wish to study numerals from a more general perspective.

I have employed a few formal conventions, which I would like to explain briefly. One results from a terminological conflict: the term *number* may refer to two completely different concepts, both of which are crucial for the study of numerals. It may refer to the number in the sense of a measure for the size of a set (cf. § I.2.4), but it may also refer to an inflectional category of many languages, which in Old English comprises the values 'singular', 'dual', and 'plural'. As there are no reasonable alternative terms for either concept, they will be distinguished by the capitalisation of grammatical categories. Hence, "number" will refer to the former concept and "Number" to the latter. Accordingly, I generally capitalise the labels for grammatical categories but not for their values. Thus notions like Gender or Case are capitalised, while their values – e.g. nominative or neuter – are not. Generally, this is probably not a necessary practice, but as we need to distinguish the grammatical category 'Number' by capitalisation, equivalent categories should, for the sake of consistency, be capitalised too.

When discussing Old English expressions, I also distinguish throughout between general types of expressions, i.e. irrespective of variant forms, on the one hand (printed in italicised small caps), and individual attestations (plain italics) on the other. A form such as OE *TWEN-* in *TWEN-TIG* '20' (which I analyse as an allomorph of *TWA* '2'; cf. § II.2.2) will be printed in italicised caps whenever the exact spelling or phonetic form of an individual instance is irrelevant. Only their individual realisations are indicated by plain italics, e.g. *tuen-* or *twæn-* as different instances of the type *TWEN-*. Occasionally, it seemed appropriate to explicitly distinguish between the phonological and the graphemic shape of a particular form. The general principle which I have endeavoured to follow is this: where such a distinction seems unnecessary or not helpful, the linguistic expressions are usually rendered in (plain or capitalised) italics. The phonological form is, as is customary, represented by IPA-symbols within slashes. I have marked the graphemic representation of an expression with pointed brackets. However, I do not distinguish between insular ⟨ʒ⟩ and Carolingian ⟨g⟩, rendering both as ⟨g⟩. Likewise, the runic *wynn* ⟨ƿ⟩ is rendered as ⟨w⟩. Moreover, except in particular cases, I generally ignore variant forms and use the most common Classical West Saxon form as the default lexeme for a numeral.

As a reference system to the Old English texts, I have used the short titles employed by the *Dictionary of Old English*.[1] Moreover, in the numbered examples I decided to quote an expression together with the immediate context in which it is attested. At these occasions, I have also referred to the most recent (or best) printed edition of the relevant text. When occasionally only short phrases are quoted outside the numbered examples without context, no refer-

1 For a key to the references see *DOE* or HEALEY (2000). A printed list is available in HEALEY/VENEZKY (1980), which, however, does not contain later modifications to the system of abbreviations.

ence to a printed source is given. Yet, whenever it seemed necessary, I have consulted the latest relevant editions as specified in the various publications of the *DOE*-project.

This study is, for the most part, based on the data provided by the *Dictionary of Old English Corpus* (*OEC*), the *Dictionary of Old English* (*DOE*) and in HEALEY (2000). The *OEC* basically covers one version of any preserved Old English text. Since many Old English texts are recorded in more than one version, the database does not come close to representing all of the extant linguistic data of the Old English language. If it seemed valuable, I have tried to include deviating readings of analogous texts not captured by the electronic corpus. However, even if one were to scrutinise every accessible text edition in order to gain as much of the material as possible, some part of what is actually preserved of the Old English language would still remain unnoticed as quite a number of extant manuscripts containing parallel versions have never been collated or edited. Therefore, the present study is to some extent based on the choice of base manuscripts selected by the *OEC*. Moreover, it is also limited by the way in which the linguistic data from those versions not included in the *OEC* are treated by the respective editors. Bearing these constraints in mind, the results discussed here may, in particular instances, be subject to the disparate ways in which the relevant sources are accessible. On the other hand, the material at my disposal has been rich and varied enough to give a sufficient and representative impression of what may have been the Old English language.

Chapter I
Linguistic numeral systems

I.1 Cardinal numerals as quantifiers

As a preliminary approach to a discussion of cardinal numerals, their functions and properties and their classification within the range of lexical categories, it is plausible to categorise cardinal numerals as a subclass of quantifiers. That is, cardinal numerals are part of a larger class of expressions which all specify the size of a set. The expression quantified (usually a noun) then denotes the kind of elements that are contained in this set. Quantifiers share a number of semantic and functional as well as formal properties. As for the latter, there is a range of morphosyntactic strategies employed by quantifiers – and in particular cardinal numerals – in interaction with the quantified noun. These will be discussed later in Chapters IV and V. We will first focus on the semantic aspects of quantification because, amongst other reasons, in contrast to their varying morphosyntactic behaviour, cardinal numerals are semantically extremely uniform across languages.

One important group of quantifiers comprises the quantificational categories of predicate logic, that is universal quantifiers ('all', 'every') and existential quantifiers ('an', 'some'). A variety of quantifiers may constitute an intermediate group between these two poles (e.g. 'few', 'several', 'many', 'most', etc.). GIL (2001: 1277b–1278a, § 2.3) labels this intermediate category "mid-range quantifiers". By postulating this subcategory, we take into account the fact that there is a greater semantic diversity of quantifiers in natural languages than entailed by the two prototypes or poles commonly used in quantificational logic, existential and universal.

Different perspectives on the particular properties of quantifiers may result in varying sub-categorisations of cardinal numerals within the class of quantifiers. GIL (2001: 1277b–1278a, § 2.3), for instance, groups cardinal numerals as special kinds of 'mid-range quantifiers'; cf. Figure 1.

existential quantifiers → mid-range quantifiers → universal quantifiers
↓
cardinal numerals

Figure 1. Cardinal numerals within the sub-categories of quantifiers according to GIL (2001)

Implicitly, GIL's main criterion is based on the fact that a quantifier selects a subset of elements from a larger set, which is usually represented by the extensional meaning of the quantified noun. Taking the phrase "x *apple*(*s*)" as an example, GIL's sub-categories can be described as in Table 1:

Table 1. Cardinal numerals within the sub-categories of quantifiers according to GIL (2001)

phrase	meaning	label of quantifier type
an (*apple*)	'at least one element of the class (of apples)'	existential quantifier
many (*apples*)	'more than one but not all elements of the class (of apples)'	mid-range quantifier
all (*apples*)	'all elements of the class (of apples)'	universal quantifier

Assuming a slightly different perspective, LANGACKER (1991: 81–89) distinguishes between 'absolute quantifiers' and 'relative quantifiers', the latter specifying a quantity in relation to a "reference mass", i.e. in relation to the extensional meaning of the quantified expression, thus comprising 'all' or 'most'. 'Absolute quantifiers', by contrast, specify a quantity in a more immediate way, that is without such a "reference mass" (LANGACKER 1991: 82). This group would comprise quantifiers like 'many' and 'several' as well as cardinal numerals. Although LANGACKER's classification focuses on an important aspect of quantification, it disregards the fact that in most languages there is a choice of different constructions in which quantifier and noun interact, and that the distinction between 'absolute' and 'relative quantification' is often dependent on the type of construction that is used (cf. §§ IV.3–5).[2] In English, for instance, LANGACKER's classification of cardinal numerals as 'absolute quantifiers' is valid for constructions like (1.1)a but not for a partitive construction like (1.1)b.

2 Here and in the following, but particularly further below in Chapter IV, I will use the term 'construction' for any type of a use of cardinal numerals that can be distinguished by a correlation of form (syntactic structure) and function, again without committing myself to specific theoretical implications that may be involved in a more technical sense of the term 'construction'.

(1.1)a *many / several / three apples*

(1.1)b *many / several / three of the apples*

Once a construction like the one in (1.1)b is employed, 'absolute quantifiers' also quantify a set in relation to a "reference mass". For English, we may argue that the examples in (1.1)b represent a marked construction and that, therefore, the pattern in (1.1)a is the default case which then justifies LANGACKER's categorisation. It is questionable, however, as to what extent this would apply cross-linguistically.

But even if we ignored this aspect of LANGACKER's categorisation, cardinal numerals would again share a subclass with some completely different types of quantifiers. Moreover, because a cardinality – be it '1', '4', or '27' – could potentially comprise 'at least one', 'several', or 'all' members of a set, depending on the particular case, for a study like the present one in which cardinal numerals are in the focus, both LANGACKER's and GIL's classification are equally unsatisfactory. Without disputing the values of each of the two taxonomies, I would, for our purpose, like to shift the focus to the particular (semantic) feature which makes cardinal numerals stand out of the class of quantifiers most significantly: cardinal numerals specify the size of a set by its 'cardinality', that is, by the exact number of elements a set contains. I suggest that the feature [± numerically specific] be employed as a superordinate criterion. In this sense, numerically specific quantifiers specify the exact number of elements of a class. By contrast, numerically *un*specific quantifiers determine the size of a class in relation to the extensional meaning of the quantified referential expression. I therefore propose a modification to the position of cardinality expressions within GIL's range, taking them as independent of the two poles of numerically unspecific quantification, 'universal' and 'existential'. Accordingly, I suggest the classification shown in Table 2; cf. VON MENGDEN (2008: 291). The same distinction, though in a different context, was made for Modern German by VATER (1984: 29).

Table 2 includes a further distinction in addition to the ones drawn so far. In the following sections it will be argued that cardinal numerals form a distinct and cross-linguistically well definable subclass of numerically specific quantifiers. More precisely, I will argue that cardinal numerals are exactly that class of numerically specific quantifiers that constitute a numeral system of a particular language (cf. below § I.4). This implies that there is a group of numerically specific quantifiers which are not part of the numeral system of a given language. I will distinguish between the two by labelling them 'systemic' and 'non-systemic' cardinality expressions. 'Systemic' expressions are at the same time that subclass of quantifiers which are ‘cardinal numerals’; cf. Table 2.

Table 2. Types of quantifiers

Quantification
Specification of the cardinality of a set

numerically unspecific			numerically specific (cardinality expressions)	
universal	“mid-range” (GIL 2001)	existential	systemic	non-systemic
all, *every*, …	*few*, *several*, *many*, *most*, …	*some*, *a*(*n*)	*one*, *two*, *three*, …. *fourteen*, *twenty-three*, *one hundred and seventy-six*, ….	*dozen*, *score*. *three twenties*, *twice a hundred*
			cardinal numerals	

My analysis of the Old English numeral system is based on this distinction. It will become evident that the difference between ‘systemic’ and ‘non-systemic’ expressions is of fundamental importance to the linguistic study of numerals and numeral systems both from a cross-linguistic and a language-specific perspective. I therefore take it as a prerequisite for the description and analysis of cardinal numerals of Old English. (Cf. the summary in § I.6.1.1.)

What will remain unconsidered in this study are pragmatic extensions of the numerically specific meaning of cardinal numerals. The use of a cardinal numeral in communication may have implications that go beyond specifying the exact numerical value of a referent set. Referring to a cardinality ‘x’ may imply, depending on the context, both ‘no more than x’ and ‘no less than x’. These ‘scalar implicatures’ are described for Present-day English in HUDDLESTON/PULLUM (2002: 363–364, § 5.2). Part of the reason for not treating these aspects in this study is of a practical nature. Scalar implicatures are predominantly a feature of spoken conversation for which we do not have any reliable evidence in Old English. Moreover, it is generally difficult for the modern reader (and interpreter) to identify more subtle pragmatic implications in historical texts without lapsing into speculations. But aside from these merely technical or methodological difficulties, the potential of numerals to be used for scalar implicatures is clearly a secondary feature of their use. It is true, a cardinal numeral may be used in conversation to specify the upper or lower limits of the size of a set. However, if this is done, the numeral nevertheless specifies an exact numerical value. The difference is that the extension of the reference of the quantified expression, say a noun phrase, will be less clearly defined. But the extensional limitation of the reference, albeit less precise, still draws on an exact numerical value. So, if I say *four apples* in a context that allows the implicature 'at least four apples', the lower limits of the size of the set of apples is nevertheless defined by 'precisely 4'. Thus scalar implicatures operate on numerically specific quantification, however open the pragmatic interpretation of an utterance will be.

So far I have suggested isolating cardinal numerals from all other types of quantifiers. While I assume that the distinction between 'numerically specific' and 'numerically unspecific' quantifiers is intuitively clear, the second distinction I have made, that between 'systemic' and 'non-systemic' cardinality expressions, requires further explanation and justification. This will be done in due course (§§ I.3–4). Before continuing on this point, another important aspect of a definition of cardinal numerals needs to be discussed: the concept of 'number' and the relation to its representatives in human language, the numerals.

I.2 Cardinal numerals and numbers

I.2.1 Preliminaries: cardinal numbers as properties of sets

In the previous section, we distinguished cardinality expressions from other quantifiers by their property of specifying the size of a set in a 'numerically specific' way. This agrees with the intuitively most natural approach to numerals, i.e. to the fact that cardinal numerals are the linguistic representatives of 'numbers'. There are, in fact, some fundamental aspects of 'number' which will be worth considering when studying numerals as linguistic expressions. As a next step in our discussion, we will therefore try to approach the concept 'number' and see which definition or which aspects of existing definitions of this concept will be useful for describing linguistic numerals and numeral systems. It should be mentioned that there are several ways of defining 'number' both in mathematics and in philosophy. It is impossible to treat them all in full detail here. I will restrict myself to a synthesis of these approaches as suggested by Heike WIESE, originally in (1995a) and then, more accessibly, in (2003: particularly 43–93). WIESE's approach is particularly useful for the linguistic study of numerals and numeral systems. My line of argument in the subsequent sections – including a more precise definition of what a 'cardinal numeral' is – therefore owes a great deal to WIESE's study and its sources.

The size of something can be seen as a particular property of it. So, if quantifiers – and, accordingly, cardinal numerals – specify the size of a set we can say that they refer to a particular property of sets. For example, we may at a first glance find absolutely nothing that, say, an apple has in common with a book. There is no property we could think of immediately that the two concepts, 'apple' and 'book', have in common. However, if we compare the properties of a set of five apples with those of a set of five books, we will be able to find a common property between the two groups of things. A set of five apples shares one common property with a set of five books, namely the property of containing five elements. This particular type of property of a set – the number of elements contained in a set – is called its 'cardinality'.

Now, if we compare two sets of the same cardinality, it may perhaps suffice to say that a given set A (say, a set of five apples) has the same number of elements as a certain set B (say, a set of five books). However, if we would like to refer to this property, for instance when buying apples or books in a shop, we need to specify or label these properties, or, to put it more simply, we need to give a name to each cardinality. For this purpose, it does not suffice to know that a particular group of apples has as many elements as some other set. What we then need is some abstract system for representing these cardinalities without referring to some particular real-world class of concrete objects (such as apples) in the respective context. In short we need a device to specify this property in an abstract way.

Bearing in mind that the general aim of this chapter is to find out how such a system, the numeral system, is generated and used, we will now first clarify in what way cardinal numerals are related to numbers. Recall that we said that cardinal numerals are that particular type of quantifiers that specifies the size of a set in a *numerically specific* way.

I.2.2 Numbers as ordered sequences

Generally speaking, if we wish to specify the cardinality of a set, we are aware that we employ numbers in some way. WIESE (2003) describes this intuitive relation between 'numbers' and the size of sets by saying that, when we specify the cardinality of a set, we *assign* numbers to sets. Numbers may, therefore, be seen as a kind of device that we need for specifying the cardinality of a set. These devices may occur in various types of manifestations. These different types of manifestations are all different systems of numerals. One type of such a device could be the class of lexical expressions of human language that we are speaking of, numerals as number words. But there are other types of devices that are as familiar to us as number words. We could just as well think of numerals as written characters (such as the Hindu-Arabic notation) as being precisely such a system. Just as plausibly, we could employ the letters of an alphabet for specifying cardinalities, as was done in Ancient Greece where letters were used as numerals. It is also possible to use a salient sequence of parts of the human body as instances of numbers. The most common method of this kind is the use of our ten fingers for indicating cardinalities. In other words, even our ten fingers can be used as numerals, because it is possible to use our fingers for assigning numbers to sets. In this case, we would specify the cardinality of a set by means of a gesture. These systems are more or less all either familiar to us or at least conceivable and any of these systems could easily serve our purpose.

From the observation that quite different manifestations of numbers can be used for the same purpose, the question of what all these different devices have in common arises. This question will help us to base the relation between 'cardinalities' and 'numbers', and between 'numbers' and 'numerals' on a more solid ground than our intuitive first approach can. Since all the systems mentioned here serve equally well in assigning numbers to (sizes of) sets, we may assume that there is something all these systems have in common which, once we have identified it, would help us to trace the true nature of numbers. One feature which all these systems have in common is that the entities employed in the respective systems are all distinct from each other. It would, for instance, be impossible to use the Hindu-Arabic numerals if two of the characters looked exactly the same, so that the sequence would go, for instance, ⟨1, 2, 3, 4, 5, 3, 7, 8, etc.⟩. In a similar way, it would be impossible to use number words for specifying cardinalities if there were homonymous cardinality expressions within one variety of a language (cf. HURFORD 1975: 101 and 1987: 28; WIESE 2003: 71).

Another feature common to all the systems listed above is that, in any of them, all the entities have a well-defined place in the way they are arranged. That is, the entities used in systems for cardinal number assignment (of whatever type) do not only form sequences, but each entity also has a fixed place within a sequence. If this were not the case, they could not serve our purpose of assigning cardinalities. If, for instance, there was some variation as to whether the Hindu-Arabic number sign ⟨3⟩ precedes or follows the symbol ⟨4⟩, the whole system of numerals would not work.

Therefore, the two crucial properties of any system that can be used as numbers are these:

- The elements of the system must be well-distinguished from each other.
- The elements of the system must form an ordered sequence.

This applies not only to written or spoken numerals, but also just as well, for instance, to finger counting: our ten fingers are well-distinguished from each other and they are arranged in a saliently fixed order. STAMPE (1976: 600) explains the importance of a fixed order of entities for counting:

> Order is universal in counting. The things counted need not be ordered: each counting imposes an order, but the sum is the same regardless of this order. The numbers we count *with* are strictly ordered, however, so that the value of each corresponds to its place in the counting order. [Italics original]

If we now conflate the two common properties of any conceivable system of elements which may potentially serve as numbers, we can say that every system for assigning cardinalities to sets must consist of an *ordered sequence of well-distinguished elements*. This definition, by the way, will help us in delimiting more precisely cardinal numerals from other numerically specific quantifiers in a language; cf. Table 2. Before doing this (§ I.3), a few more important points on 'numbers' and 'numerals' will be discussed in the following.

In accordance with what we have just outlined, WIESE (2003: 64) argues that it is exactly this property – the property of being an *ordered sequence of well-distinguished elements* – that defines numbers. Any class of entities which matches this description may serve as numbers. We therefore do not need to assume any additional abstract set of entities. Numbers are tools that can be used in 'number assignment' and, as such, they may occur in various different forms provided they constitute an ordered sequence of well-distinguished entities. It is in this sense that different forms of numerals are simply different possible instantiations of numbers. WIESE further writes (2003: 64):

> Once we regard numbers as tools in number assignments, we see that there is no need to define properties that pick out one and only one particular progression. What makes numbers so powerful is exactly the fact that they relate to a small set of fundamental features for their tasks, and to no more. … this view acknowledges [numbers] as powerful, efficient, and highly flexible devices with many possible instances. If our number assignment is to be intersubjectively comprehensible, it is merely relevant that the sequence we are using is one that is conventionally acknowledged as a number sequence, such that the relations holding in our numerical relational structure are clear.

The "small set of fundamental features" WIESE refers to are exactly the two properties we have singled out as the common properties of the various kinds of systems for number assignment in human culture. In other words, all that is required for a set of entities to serve as numbers (i.e., to be employed in number assignment) is their being well-distinguished from each other and their having an internal order fixed either by convention or in a sufficiently salient way.

What is crucial about this approach to numbers is that we can do well without assuming some prototypical set of 'numbers' to which numerals (of any kind) would refer. Such a set of abstract concepts would not have a single property in addition to those of the systems of representation listed above. Once the respective system shares the two definitory features (i.e. once they constitute a conventionalised ordered sequence of well-distinguished entities), numbers can be instantiated in various different forms or, as WIESE puts it, they are "devices with many possible instances". Accordingly, numerals do not refer to numbers, they *are* numbers or, more precisely, each numeral system is one of many possible instances of numbers. (Cf. BENACERRAF 1965; WIESE 2003: 68–93. See also the discussion in HURFORD 1987: 86–131 who takes on a more sceptical view on the unified analysis of numbers and numerals. For a summary of this discussion see below §§ I.6.2.1–2.)

I.2.3 Different types of number assignment

What are numbers then compared to all these different sorts of numerals or 'number signs'? There is one important distinction which we have not made explicitly so far. As to linguistic expressions, there is, theoretically, a difference between *cardinal numerals* and *counting words*; cf. HURFORD

(2002: 629b). While the former are those expressions that we use for referring to cardinalities, i.e. numerically specific quantifiers, the latter is the set of non-referential expressions that is used in the conventionalised counting sequence; cf. WIESE (2003: 265–270). As the two types of expressions are homonymous in English and in many other languages, this distinction may perhaps not seem all that obvious at a first glance. But there are some languages in which cardinal numerals can be distinct from the respective counting words. Hungarian, for instance, uses *kettő* '2' in the counting sequence but *két* when quantifying a noun. Likewise, German uses *eins* for '1' in a counting sequence and inflected forms of *ein* for '1' (none of which is *eins*) when quantifying a noun. In Japanese there is a native set of numerals from '1' to '10', which is predominantly used as a counting sequence. A fully developed complex numeral system is based on Chinese numerals. Although, according to STORM (2003: 98), there is no clear-cut distinction, the Chinese numerals seem to be used predominantly as cardinal numerals whereas the native set is used as counting words up to '10'. For some more examples see GREENBERG (1978: 287) who distinguishes between "absolute forms" ('counting words') and "contextual forms" ('cardinal numerals'); cf. below § I.6.2.4.

To be precise, if we specify cardinalities of sets, we *use* numbers to label the particular properties of sets. Most natural languages have a set of words that meets the requirements for being used as numbers, a conventionalised sequence of counting words. Just like, for instance, the Hindu-Arabic numerals, Roman numerals, or a conventionalised sequence of body parts, the expressions used in the conventionalised counting sequence are (linguistic) instances of numbers. Once we assign them to a particular cardinality, that is, once we employ these tools for specifying a cardinality, they are used as cardinal numerals. While the expressions of the counting sequence are non-referential and are, just like other instances of numbers, defined only by being in a fixed ordered relation to each other, cardinal numerals are referential expressions because they refer to a particular property of a set, i.e. to its cardinality.

Numbers can be assigned in different contexts. While *cardinal* number assignment specifies the cardinality (the number of elements) of a set, *ordinal* numerals assign a place within a fixed order to a particular element of a set. STAMPE (1976: 600) considers ordinal number assignment as secondary as compared to cardinal number assignment. This assumption is, however, logically not necessary. The mapping of any ordered sequence of well-distinguished elements onto the elements of a set would be no less immediate if we did this by determining the place in the order of elements (ordinal number assignment) than if we aimed at specifying the cardinality of the set (car-