RELATIVE CLAUSES IN OLD HIGH GERMAN. A CORPUS-BASED STATISTICAL INVESTIGATION

ABSTRACT

In this paper we investigate the properties of Old High German relative clauses. A striking fact is that the finite verb in these constructions can precede or follow its object(s). We survey different possible factors proposed in the literature that could determine the VO/OV order, such as presence of a relative particle, definiteness of the antecedent, specificity of the referent, and type of the relative clause (restrictive or appositive). Our investigation based on a corpus of non-translated texts reveals that the only factor that has statistically significant influence on word order is the type of the relative clause.

1. INTRODUCTION. The literature on German relative clauses is very extensive and, in particular, a large amount of scientific work has been written on the historical development of these constructions (not only on German but also on other Germanic languages).[1]

In this paper, we want to focus on some of the properties of the relative clauses we observe in Old High German.[2] Even though we will not discuss all the different types of relative constructions attested during this period, we provide a brief overview of the most important types below. Based on Schrodt (2004: 172ff), we can classify OHG relative clauses according to their introducing elements:

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[1] This is just a short list of some of the most important work written on German relative clauses and on their historical development: Tomanetz (1879), Delbrück (1909), Wunder (1965), Fleischmann (1973:114ff), Baldauf (1983), Lehmann (1984), Hock (1991), and more recently Axel-Tober (2012). Even though Fleischer (2005) does not focus on diachronic variation, he gives an interesting overview of synchronic variation in German dialects.

[2] Old High German (OHG, 750-1050) is the earliest attested variety of High German, followed by Middle High German (MHG, 1050-1350), Early New High German (ENHG, 1350-1650), and New High German (NHG, since 1650).

1. Asyndetic relative clauses: this rare type of relative clause is introduced neither by a particle nor by a relative pronoun:[3]

(1) enti quad zu dem [Ø dar   uuarun]
     and said   to those   there were

     et ait his, qui erant ibi

        'and said to those that stood there'
     (MF 26.71, cited in Schrodt 2004: 174)[4]

2. Constructions introduced by a relative particle (*the*, *de*, *thi*, etc.): they are characterized by the presence of an uninflected element introducing the relative clause.

(2) thero   manno,   [**thi**   ih hera nu   bat   ]
     DEM-PL.GEN man-PL.GEN PART.REL I   here now   asked

        '[none] of the men I asked to come now'
     (O 4.6.25, cited in Schrodt 2004: 175)[5]

The particle can also be used as "reinforcement" of a relative pronoun (in the example below, *ther + de/the*):[6]

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[3] Each example in the paper was glossed and translated. If available, the Latin source is indicated after the glosses. This is a list of the abbrevations used in the glosses: ACC = accusative, DAT = dative, DEM = demonstrative pronoun, F = feminine, GEN = genitive, M = masculine, N = neuter, NEG = negation, NOM = nominative, PART = particle, PL = plural, REL = relative, SG = singular, SUBJ = subjunctive.

[4] In Schrodt (2004: 174), the adverb is spelled *das*. Since Hench's (1890) edition reports *dar*, we decided to correct the text accordingly. Furthermore, we changed the abbreviation "M" for the Mondseer Fragmente – used in Schrodt (2004: 174) – to "MF", since the first abbreviation is often used for Muspilli.

[5] Kelle (1869: 355) does not interpret *thi* as a particle but provides a phonological explanation for it, instead: "Relativ ist *e* bei folgendem Vokal manchmal abgeworfen" ("in relative clauses, *e* followed by a vowel is sometimes dropped", our translation). The full form would be *thie*. The question remains why this reduction should only take place in relative clauses.

(3) [**ther-de**   mih   gisihit]   gisihit then
     Dem-M.Sg.Nom-Part.Rel   me   sees   sees   Dem-M.Sg.Acc

     [**ther-the**   mih   santa]
     Dem-M.Sg.Nom-Part.Rel   me   sent

     Et qui videt me videt eum qui misit me

       'The one who looks at me is seeing the one who sent me'

     (T 143.2, cited in Schrodt 2004: 175)

3. Constructions introduced by a relative pronoun: this is the only type which is still attested in
    standard Present-Day German (PDG). These relative clauses are introduced by a relative
    pronoun:

(4) Iudas Scarioth, [**ther**   inan   uuas selenti]
     Judas Iscariot   Dem-M.Sg.Nom him-Acc   was   betraying

     Iudas Scariothis, qui erat traditurus eum

       'Judas Iscariot, which should betray him'

     (T 138.2, cited in Schrodt 2004: 176)

As this short typological inventory shows, not all types of constructions are attested up to the
present day. Notice further that, in canonical subordinate clauses, the finite verb typically
occupies the final (or a late) position in the clause and, in fact, all the examples provided above

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[6] In OHG, like in other Germanic languages, the (short) demonstrative is used in relative
contexts. Since there is no morphological variation between demonstrative and relative pronoun,
we decided to gloss the clause-introducing element in a relative clause as a demonstrative.

are cases of verb-final relative clauses.[7] However, this is probably not the only pattern we find in OHG. Particular constructions that are often analyzed as relative clauses are those displaying a non-canonical verb position, namely V1 and V2 relative clauses, which are sometimes assumed to be distinguished by the fronting of the finite verb and by other peculiar properties, which are discussed in detail by Axel-Tober (2012):

(5)   In dem mere ist einez, [Ø heizzet   serra]
      in the sea is one   is.named sawfish

         'There lives one in the sea which is named sawfish'

      (APh 104, cited in Axel-Tober 2012: 199)[8]

(6)   sum   tuomo uuas In sumero burgi | [ther   niforhta   got]
      certain judge was in certain town   DEM-M.SG.NOM NEG-feared god

      Iudex quidam erat In quadam ciuitate | qui deum non timebat

         'There was a certain judge in a certain town who didn't fear god'

      (T 200, 31, cited in Axel-Tober 2012: 208)

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[7] Following previous work (such as Delbrück 1878, 1911 and Lehmann 1974), Axel (2007: 27ff) argues that the basic order in OHG (up to PDG) is the verb-final one. In contrast, the typical V2 order observed in OHG (and PDG) main clauses is assumed to be derived from the one of subordinate clauses by means of two types of movement:

1. movement of the finite verb to C;

2. fronting of one constituent (or XP-fronting) to SpecC.

This can be illustrated by means of the following Isidor example:

(i) Druhtin$_j$ suuor$_i$ t$_j$ dauite   in uuaarnissu t$_i$
    Lord   swore   David-DAT in truth

    Iurauit dominus dauid in ueritate

       'The Lord swore to David in truth'

    (I 610, cited in Axel 2007: 4, our syntactic annotations)

[8] Axel-Tober (2012) argues that, in such cases, the verb moved to C, but no XP fronting to SpecC has taken place. That is why the clause surfaces as a V1 clause.

A further problematic aspect, which is orthogonal to all types considered so far, is the position of the verb (V) with respect to the object(s) (O) or to the arguments the verb selects. While in V1 and V2 relative clauses the movement of the verb results in a VO pattern, we would expect that V-final relative clauses systematically display an OV order. But this is not always what we can observe, since OHG also allows for a VO pattern even if the verb has not been fronted to the second position (verb-late order).[9]

(7) Daz ist daz hêreste guot, daz der uore gegariwet
    that is the greatest wealth-N DEM-N.SG.NOM PART.REL before afforded

    <u>ist</u> **gotes trûtfriunden**
    is gods intimate.friends-DAT

    'This is the greatest wealth which is provided to God's intimate friends before'

    (HiH, 36)

In the literature, different semantic and syntactic properties of relative clauses have been associated with one of the two possible word orders, such as definiteness of the antecedent, specificity of the referent and the type of relative clause (restrictive vs. non-restrictive). This is the reason why we decided to test these hypotheses based on a corpus investigation.
A number of theoretical investigations explore relative constructions in order to explain their origin and development. However, testing such hypotheses was a difficult task, since no annotated corpus was available until recent years. By now, a number of historical texts have been digitized and annotated morphosyntactically. In particular, a reference corpus for the OHG epoch is now available (see next section). Thus, modern quantitative analyses can now be conducted to

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[9] Syntactically, such examples could be explained either by assuming that objects can be "extraposed" (Axel 2007: 80) or by arguing that the verb may also be base-generated in or moved to a position preceding the object for information-structural reasons (Hinterhölzl 2009, Petrova & Hinterhölzl 2010, Schlachter 2004, 2012, Tomaselli 1995, Weiß forthcoming), as schematized below:

(i) a. $[_{VP}\ t_i\ V]\ O_i$ VO as result of the "extraposition" of the object

   b. $[_{VP}\ V\ O]$ VO as base-generated order

   c. $V_i\ [_{VP}\ O\ t_i]$ VO as result of verb movement

test the hypotheses in the literature and/or to formulate new ones. Eventually, corpus-based investigations should allow us to better understand specific syntactic phenomena. In this paper, we want to present the results of a pilot study in which we tested some traditional hypotheses regarding OHG relative clauses. Whilst conceding that the results presented below are based on a small data size and that a larger corpus investigation is called for, we are fully convinced that the findings are representative for the phenomena discussed.

Especially, the following research questions are addressed below:

- Since the first written attestations, the typical order of subordinate clauses is OV. Do relative clauses line up with this general tendency? How often do they deviate from this pattern?
- How frequent are relative clauses introduced by a relative particle with respect to the clauses introduced by a relative pronoun? And more importantly, is there a relationship between VO/OV orders and the presence of a particle?
- Are the definiteness of the antecedent and the specificity of the referent of any influence on VO/OV orders?
- Is there a relationship between VO/OV orders and the type of relative clause (restrictive, free, and appositive)? Further, is there a relationship between subject-verb/verb-subject (SV/VS) orders and the type of relative clause?

Anticipating the discussion below, our main finding will be that the only factor determining the VO/OV order is the type of relative clause, the other factors – i.e. presence of a particle, definiteness of the antecedent and specificity of the referent – having no statistically significant influence on the distribution of the two patterns.

2. EMPIRICAL APPROACH. The well-known major OHG texts are not suitable for our syntactic investigation due to various reasons, such as dependency on metrical schemes and the influence of the Latin original. Therefore, it seems to be more appropriate to compile a corpus comprising more or less independent, non-translated texts. According to this, the data source for our observation of OHG relative clauses is a corpus of autochthonous texts which are part of the collection of so-called "minor OHG texts" (Steinmeyer 1971). These texts are digitized in TITUS[10] and linguistically annotated in the Old German Reference Corpus (OGRC),[11] which provides a digital, parsed and searchable database of the entire text corpus of written Old German (i.e. OHG as well as Old Saxon).

Our corpus comprehends 25 OHG texts from the beginning of the written tradition in the late 9th century until the period of transition to MHG in the 12th century.[12] It covers all OHG dialect areas although texts from the southern language area predominate, as a result of matters of textual tradition in general.

With our research questions in view, we created a dataset by searching for clauses that were annotated as relative clauses.[13] We also considered those relative clauses (namely free relatives) that also function as argument clauses (subject or object clauses) in certain contexts.[14] Finally, clauses annotated as a main clause that are introduced by a demonstrative were included as well. In all stages of the German language, demonstrative and relative pronouns are homophonous (unless they are interpreted as one part of speech). Therefore, a distinction between V2 relative clauses and main clauses is often unclear. Consider, for example, the case in (8). The second

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[10] http://titus.uni-frankfurt.de/indexd.htm.

[11] http://www.deutschdiachrondigital.de/home/.

[12] In the collection of the minor OHG texts, there are some texts that strictly speaking do not belong to the OHG period, given that they were written down at the end of the 11th or during the 12th century. Nonetheless, these texts can be considered to be based on OHG sources or to belong to the OHG tradition, the manuscript having been issued in the MHG epoch. That is why we speak of a "period of transition".

[13] For more detailed information on annotation and tags used, see Appendix A.

[14] See Appendix A for further details on this point.

conjunct may be interpreted either as a main clause or as a relative clause, according to the reading assigned to the pronoun, namely as a demonstrative or as a relative pronoun:

(8) Ne-bis-tu   liuten   kelop   mer   than Iacob.
     NEG-are-you people-PL.DAT well-known more   than Jacob

     ther   gab uns thesan brunnan
     DEM-M.SG.NOM   gave us   this   fountain

     'You are not more well-known to the people than Jacob. He gave us this fountain (…)'

     or '(…) who gave us this fountain (…)'

     (Ch, 15)[15]

All in all, this initial research yielded more than 700 clauses. Our queries produced in all likelihood all the relative clauses that are present in the selected subset of OGRC. However, they were too general to exclude also those clauses that cannot be considered as relative clauses. Therefore, a two-step methodology followed to turn the query output into a dataset that could be used for a modern corpus linguistic analysis.

The first step consisted in manually analyzing each case and in removing those clauses that did not fulfill the function of a relative clause. To decide whether or not a clause is a relative clause is already a source of great debate. Obviously, formal characteristics (such as the order of the object with respect to the verb) could not always be used to support our decision, since they were the subject of our investigation. Inevitably, the decision was in some cases entirely a matter of interpretation. At the end of the first step, 144 clauses remained in the dataset.

The second step consisted in enriching the remaining relative clauses with additional syntactic, semantic and information-structural data. The characteristics that are annotated in the dataset and relevant for the current study are discussed in the following paragraphs.

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[15] Notice that the Latin source reports the relative pronoun *qui* 'who'. Sometimes, a Latin source can help us choose the right interpretation for the pronoun.

3. ANALYSIS AND DISCUSSION. The following sections contain a statistical analysis of the data collected and annotated for the current study, together with a thorough discussion of the different factors that could possibly influence word order.[16] Examples will be given for the different properties and the empirical results are discussed in detail. As mentioned above, we will discuss the following aspects:

- VO/OV order
- SV/VS order
- presence of relative particle
- definiteness of the antecedent
- specificity of the referent
- type of relative clause (restrictive vs. non-restrictive)

3.1. VERB POSITION AND INFORMATION STRUCTURE. One of the most important topics on which the current paper focuses is the position of the finite verb in relative clauses. According to the widely accepted assumptions, the typical order in subordinate clauses is the "basic" OV order. In recent syntactic investigations (for example in Hinterhölzl 2009, Petrova & Hinterhölzl 2010, Schlachter 2004, 2012), it has been argued that the positioning of objects with respect to the verb is information-structurally determined. In particular, the VO order is assumed to be associated with (a particular type of) focus on the object. Citing the following example from Tatian, Hinterhölzl (2009) analyzes the object as constituting the new information focus in the context:

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[16] For more details on the data analytics and statistical techniques, see Appendix B. For details on the R code used, see Appendix C.

(9) Inti bráhtun imo / alle ubil habante / (…) / Inti thie thár   hab&un **diuual**
     and brought him all evil having-Nom.Pl and those Part.Rel[17] had   devil

     & obtulerunt ei / omnes male habentes / (…) & qui demonia habebant

       'and they brought him all the sick ones and those that had the devil'

     (T 59, 1, cited in Hinterhölzl 2009: 48)

From an information-structural point of view, this seems to be a well-established fact by now. But we pointed out above that, on the syntactic level, different interpretations for such VO orders in embedded contexts have been proposed. For example, Axel (2007: 80ff) interprets the VO order in subordinate clauses not as the result of verb movement, but rather as the result of "extraposition" of the object. Also according to Hinterhölzl (2009), no verb movement has taken place in such cases, but he assumes instead that the object is base-generated after the verb (following Kayne's 1994 Universal Base Hypothesis). In contrast, other authors, such as Schlachter (2004, 2012: 55ff), argue that in subordinate clauses, the verb may move to a higher syntactic position, namely to a medial I-position, thus yielding a surface VO order.

In this paper, we analyze in a first step the syntactic positions of the different elements relative to their linear occurrence on the surface. Only in a second step, we discuss the aspects observed in consideration of theoretical assumptions made in the literature.

Notice that the OHG verb is typically realized by a unique, finite verb form, complex predicates being comparatively less frequent. Thus, the question about VO vs. OV orders often coincides with the question of the position of the object with respect to the finite verb.

Let us start with the question how often the finite verb comes before or after the object(s) in our corpus. First, we restricted the dataset to clauses that can answer this question: these clauses should not have the relative pronoun to fulfill the function of object (because, in that case, it

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[17] The term *thár* 'there' is originally a locative adverb. However, we decided to annotate it as a relative particle in this context, even if, in traditional literature, the term "relative particle" is restricted to the lemma *the*. See discussion in 3.2.

would be automatically in front of the verb for independent reasons).[18] Then, we simply counted in how many clauses the object occurs in front of the verb (10) or after it (11), as exemplified below:

(10) Nu   vuill-ih bidan den rihchan   Crist […] der   **den divvel** <u>gibant</u>
      now   want-I   ask   the powerful Christ   DEM-M.SG.NOM the devil   enchained

      'Now I want to ask the powerful Christ who enchained the devil'

    (TV, 1)

(11) einer got   almahtig, der   <u>scuof</u>   **himil   enti erda**
      one   God almighty DEM-M.SG.NOM created heaven and   earth

      'One almighty God, who created heaven and earth'

    (BB 3)

Strictly speaking, predicatives are not objects, but their position with respect to the verb can be considered as diagnostics for the type of word order (VO vs. OV). That is why we decided to treat them on a par with objects for our calculation. The examples below illustrate the predicative-verb and the verb-predicative order, respectively:

(12) anderes   manages   thes   ih   uuidar   got   **sculdic** <u>si</u>
      other-GEN many-GEN DEM-N.SG.GEN I   against God guilty   am-SUBJ

      'many other things which I am guilty of in front of God'

    (MB, 16)

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[18] Those cases and clauses without an object at all – total of 66 clauses – were annotated as *na* (= not applicable):

(i) denne der   paldêt, der   gipuazzit   <u>habet</u>
    then   DEM-M.SG.NOM hopes   DEM-M.SG.NOM suffered   has

    'Then the one who has suffered takes comfort'

    (M, 99)

(13) nu   hebist   enin der-n-<u>is</u>   **din**
      now   have-SG.2   one   DEM-M.SG.NOM-NEG-is   yours

         'now, you are with someone who doesn't belong to you'

     (Ch, 27)

Thus, all types of objects (also prepositional ones) as well as predicatives were considered as "objects". From this, we got Table 1.

	O > V	V > O
Frequency distribution	59 (76%)	19 (24%)

Table 1. Frequency distribution of VO/OV orders

Let us first consider the position of the verb in the relative clauses. The data in Table 1 shows a clear preference for the OV pattern (76%). Interestingly, this pattern is very similar to the distribution of relative clauses in Isidor described in Schlachter (2012: 62ff), following Robinson (1997). Her data show that relative clauses belong to the types of subordinate clauses with the lowest rate of "Verbfrüherstellungen" (literally, 'verb-earlier-position'), i.e. of cases in which the verb does not occur in the last position (27%). Relative clauses are shown to behave similarly to modal clauses (25%), only conditional clauses displaying a significantly lower rate of "Verbfrüherstellungen" (17%).[19]

A possible explanation for the relatively low number of VO cases could be explained by the limited information-structural potential of relative clauses, at least of restrictive ones (for example, cf. Holler 2005: 58ff). While the OV pattern is always available in subordinate clauses (and thus, also in relative clauses), the VO order is possibly restricted just to those cases in which the object is focused. This information-structural strategy seems to be only available in context with larger illocutionary potential. In fact, we expect for it to be mainly possible in non-restrictive contexts.[20] Other types of subordinate clauses (for instance, argument clauses and

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[19] Slightly different data are reported in Petrova (2009: 253) for Tatian, where non-Vend-orders amounts to 34.2% of the total cases.

[20] Notice that example (13) exemplifies the case of a restrictive relative clause. Nonetheless, it is only apparently an exception. At least two reasons lead us to think so:

causal clauses) generally display a higher illocutionary and information-structural potential (cf. Schlachter 2012: 66ff). As Schlachter (2012: 62ff) and Robinson (1997) show, these pattern differently from relative clauses in allowing a higher number of "Verbfrüherstellungen". Consider now subjects. At least in main clauses, subjects appear to be possible in postverbal positions too. This order is a well-established Indo-European pattern (cf. Matras & Sasse 1995). For our corpus, we decided to annotate the syntactic behavior of subjects as well. The largely prevailing pattern is the one in which the subject precedes the finite verb, as in example (12). Again, we restricted the database to relative clauses in which the subject function is not fulfilled by the relative pronoun (since, in such cases, the subject is in front of the verb for independent reasons). See example (13).

The alternative VS pattern is maybe attested in only three cases, similar to the following one, which however, in generative terms, should be better explained by assuming that the adverb *umbe* is the non-finite part of the verb, i.e. a verb particle in modern terms, and that the finite part of the verb moved in front of the subject:

(14) tiu   sint zimber, mit dien   <u>gat</u> **er** umbe
     DEM-N.PL.NOM are buildings in DEM-N.PL.DAT goes he   around

       'those are buildings within which he wanders around'

    (DD, 20)

In generative terms, such VS pattern can thus be explained not as a real "extraposition" or "base-generation" of the subject in the position following the verb (together with the adverbial element), but rather by means of a movement of the verb to a position preceding the subject, which in turn triggers a V2 pattern in this case.

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1. This is probably a case of verb preposing triggered by the specific character of the indefinite antecedent. This is one of the V2-relative clauses investigated in Gärtner (1998, 2001) and Axel-Tober (2012).
2. The relative clause possibly displays the VO order for rhyme reasons (*sin* 'be', in the preceding half-line).

The examples in our corpus are probably not representative of the phenomenon, but subject "extraposition" is claimed to be possible in OHG even in subordinate clauses. Some clear cases have been discussed in the literature, such as the following one cited in Axel (2007: 91):

(15) dhar chiquhedan <u>uuard</u> **got** **chisalbot**
     where mentioned became God-NOM anointed

    cum deus unctus insinuator

       'where the anointed God was mentioned'

    (I 3,2)

Even if we accept to consider examples like (14) in our corpus as VS cases (with extraposed subjects), the distribution of the subjects in our corpus shows a clear dominance of the SV order (94%):[21]

	S > V	V > S
Frequency distribution	45 (94%)	3 (6%)

Table 2. Frequency distribution of SV/VS orders

The stronger effect in this case may be explained by the syntactic properties of subjects, which is realized in a syntactically higher position than objects (for example, cf. Frey & Pittner 1998). Objects – being syntactically lower – may be easily found in postverbal position when focused (via extraposition or movement). In contrast, subjects tend to be realized in preverbal position (maybe a high syntactic position) even when focused. Their syntactic requirements thus seem to be strong enough to guarantee that they are not extraposed even in cases in which information-structure – say focus – would require it.[22]

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[21] Total numbers of na-cases: 96.

[22] That the postverbal position of subjects is much more restricted than in the case of objects, is confirmed by the data in HIPKON, a diachronic corpus on the filling of the so-called *Nachfeld* (i.e. that part of the sentence following the typical position of non-finite verb forms in main declaratives). See Coniglio & Schlachter (2015a, 2015b). The corpus, which includes sermons from the MHG period to the beginning of NHG, show that, in main clauses, the postposition of

Beyond information-structural and syntactic factors, the distributions in Table 1 and Table 2 may be related to different influencing factors. In the following sections of this paper, we intend to investigate other potential influencing factors that are sometimes discussed in the literature. We will show that neither the presence of a relative particle, nor the definiteness of the antecedent, nor the specificity of the referent has any influence on the VO/OV pattern. To anticipate the discussion below, we will argue that only the type of relative clause (restrictive vs. non-restrictive) influences the word order and that this can be ultimately led back to the information-structural properties of the two types of relative clauses.

3.2. RELATIVE PARTICLES. The first factor that could possibly influence the VO/OV pattern is the presence of a relative particle. As shown in (2) and (3) above, relative particles (such as *the*, *de*, *thi*, etc.) are sometimes used to introduce relative clauses, either alone or along with relative pronouns. The traditional assumption is the one espoused in Schrodt (also cf. Tomanetz 1879: 84ff, among others):

> "Während von einem Relativpronomen eingeleitete Relativsätze Späterstellung des finiten Verbs haben, weisen die von einer Relativpartikel eingeleiteten Sätze Verbzweitstellung auf (…). Die Relativpartikel war somit nicht subordinierend" (Schrodt 2004: 174)[23]

According to this view, the relative particle is just an element introducing the relative clause, but not a syntactic subordinator. A different approach is the one proposed in Axel-Tober (2012: 195ff). She interprets the particle as a subordinating element that blocks the movement of the verb, which thus remains in situ. The expected word order is thus the OV order. She explains the deviating VO pattern, by assuming that the object has been "extraposed" in such cases (Axel-Tober 2012: 213).

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subjects is still possible in MHG texts, but decreases more rapidly than the postposition of objects and predicatives in the following epochs.

[23] "While relative clauses that are introduced by a relative pronoun have late placement of the finite verb, relative clauses that are introduced by a relative particle display V2 order. [...] Thus, the particle was not subordinating" (our translation).

The diverging opinions in the literature led us to test this factor as well. For our calculation, we did not only count those relative clauses that display what is considered to be a relative particle in traditional terms (such as *the, de, thi*, etc.), but we also considered adverbial elements that behave like particles, such as *dir, der, ther, dâ, dâr*.[24] Hence, we will not distinguish between relative particles and relative adverbs and we will refer to them in short as "relative particles" (cf. Diels 1906:180ff).

Notice further that, for the sake of comparability with the other factors, we decided to discuss the results of the test on the VO/OV orders, instead of those on the V2 vs. non-V2 orders. (Nonetheless, the reader will find the results for V2 vs. non-V2 orders in a footnote.) There was also a methodological reason for doing so: the notion of V2 is theory-dependent and the V2 vs. non-V2 order cannot be easily tested without having a particular syntactic theory in mind, which we intended to avoid when collecting the data. For example, if we observe the order in (16a), we cannot conclude that we are dealing with a V2 pattern, since we could interpret it as a case of "extraposition" (16b), for example (as proposed in Axel-Tober 2012: 213):

(16) a. demonstrative+particle   V O

  b. demonstrative+particle t_i V O_i

More generally, the OV order of subordinate clauses is a non-V2 order, but the VO order is not automatically a V2 order. Nonetheless, if the data show robustly that the VO order mostly occurs under certain conditions, then we can conclude that these conditions either correlate with V2 or with the "extraposition" of the object.

According to our annotation schemes, four combinations were possible:

1. Relative particle with OV order:

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[24] In historical terms, all these elements trace back to an Indo-European pronominal stem **to-*. Braune (2004: 249) points out that, in relative contexts, only phonologically weakened forms of the locative adverb appear (adverb *dâr* > particle in relative contexts *dar/da/de)*. This circumstance leads to the fact that the locative adverb often resembles the relative particle *de*.

(17) dar niist eo so listic man der   dar **iouuiht**
there NEG-is ever so clever man DEM-M.SG.NOM PART.REL anything

arliugan <u>megi</u>
mock can-SUBJ

'There is not so clever a man that could mock anything'

(M, 94)

2. Relative particle with VO order:

(18) alle gotes trûtfriunt, die   der   <u>hant</u> eruullet **diu**
all God's intimate.friends DEM-M.PL.NOM PART.REL have fulfilled the

uier euangelia
four gospels

'all God's intimate friends, who fulfilled the four gospels'

(HiH, 10)

3. No relative particle with OV order:

(19) Hluduig ther   gerno **gode** <u>thionot</u>
Ludwig DEM-M.SG.NOM willingly God serves

'Ludwig, who serves God willingly'

(L, 1)

4. No relative particle with VO order:

(20) Truhtin suno einboraner Heilanto Christ (…) Ther   <u>nimis</u> **sunta**
Lord son only savior Christ DEM-M.SG.NOM you.take sins

uueruldi
world-GEN

'Lord, God's only son, Christ the redeemer, who takes away the sins of the world'

(WK, 113)

In some cases, these relative elements are homophonous with the locative adverb meaning 'there' (cf. fn. 24). That is why it was not always possible to determine whether we were dealing with a particle or with the adverb meaning 'there'.[25]

To investigate the relationship between the VO/OV order and the presence of a relative particle, we calculate a confusion matrix with absolute frequencies and percentages of the VO/OV orders with respect to clauses for which we are certain about the status of the particle.[26] The results are presented below:[27]

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[25] We have a total number of 66 na-cases. The following is an example of a relative clause for which we could not decide whether it contains a relative particle or not:

(i) Denne verit er ze deru mahalsteti, deru dar kimarchot ist
   then goes he to the court place DEM-F.SG.DAT there/ PART.REL marked is
   'Then, he goes to the court place that is designated for this / which is delimited there.'

   (M, 77)

Notice that in this example, so-called CASE ATTRACTION has taken place, i.e. the relative/demonstrative pronoun *deru* does not fulfill the case requirements of the relative clause (nominative), but agrees with the case of the antecedent (dative).

[26] In all our tables, we decided to report the values of the independent variable in the rows, while word order is considered to be the values of the dependent variable and is represented in the columns. Accordingly, percentages were calculated horizontally (answering questions like "what is the frequency of the OV order in the presence of a particle?") and not vertically ("what is the frequency of the particle in OV orders?").

[27] Even if we consider the distribution of relative clauses with or without particles in V2 vs. non-V2 orders, we do not get any statistically significant results (Fisher Exact p: 0.74). Relative clauses with particles display V-late or V-end-orders in 21 cases, the V2 order in just 2 cases. In the absence of the particle, we get 101 V-late or V-end orders and 15 V2 cases. Number of na-cases: 5.

	O > V	V > O
Has particle	9 (75%)	3 (25%)
Has no particle	50 (76%)	16 (24%)

Table 3. Contingency matrix of VO/OV orders versus presence of relative particle
(Fisher Exact *p*: 1, Cramér's V: 0.01)

The Fisher Exact test yields a p-value of exactly 1, which tells us that there is an estimated 100% chance of observing the above frequency distribution of VO/OV orders and presence vs. absence of particles when you assume that the order and the particle have nothing to do with each other (null hypothesis). This is not surprising, since the observed percentages are almost identical. In addition, Cramér's V for this contingency table is 0.01, which indicates a weak to non-existing relationship between the VO/OV order and particle occurrence in relative clauses.

With respect to relative particles as possible factors influencing the position of the verb in relative clauses, we can conclude from Table 3 that the presence of a particle does not affect the VO/OV order. Even though the data size is quite small and we should be careful in interpreting them, the tendency in our corpus points to the fact that Schrodt (2004: 174) is not right in his conclusion that relative clauses introduced by a particle prefers V2 word order.[28] We cannot observe any significant difference between the two types of relative clauses, namely those with a particle and those without a particle. And remember that for our calculation, we considered all VO cases, not only V2 cases (cf. fn. 27). That means that we would have expected an even higher number of VO examples, according to Schrodt's hypothesis.

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[28] Schrodt's (2004: 174) second conclusion that the particle was not subordinating should probably be also rejected. Although we do not want to pursue this point further, we can conclude that the particle had a subordinating function, given that 9 relative clauses with an OV pattern are introduced by a particle. In this scenario, however, we should explain the remaining cases – the 3 VO cases with particles. A possible interpretation would be that the verb has remained in situ and that the deviating order is not derived by means of verb movement but either by means of "extraposition" of the object (Axel-Tober 2012: 213) or by means of base generation of the object after the verb (Hinterhölzl 2009: 48), maybe as a consequence of information-structural requirements.

3.3. Definiteness of antecedents and specificity of relative clause. The VO/OV order may also be influenced by the definiteness of the antecedent and the specificity of the referent. Below, we will consider each factor first, and then the interaction of both.

Definiteness of the antecedent. Axel-Tober (2012: 213) hints at a possible correlation between the definiteness of the antecedent and verb position in MHG prose texts. In particular, she argues that on the one hand, the definiteness of the antecedent correlates with a verb-final pattern (and the presence of a relative particle). On the other hand, indefiniteness is associated with a V2 order (and with the absence of the particle). She links (in)definiteness to verb position and to the absence/presence of the particle. It would be difficult for us to test both factors simultaneously, given the small amount of data that would fit the calculation. But if we ignore the factor particle (which was shown to play no important role), the factor definiteness per se could be of some influence for the VO/OV patterns in OHG as well.

We identified all types of antecedents in our corpus and we annotated them as definite (21) or indefinite (22):[29]

(21) **daz uuip**, thaz   ther   thara quam
     the woman DEM-N.SG.NOM PART.REL there came
          'the woman who came there'
     (Ch, 5)

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[29] As in the other cases, some clauses could not be ascribed to either type. Free relatives are typical examples, given that they do not have an explicit antecedent:

(i) Ther   trinkit thiz uuazzer be demo   thurstit inan mer
    DEM-M.SG.NOM drinks this water   by DEM-N.SG.DAT thirsts him more
         'Whoever drinks of this water shall thirst again'

   (Ch, 18)

For this calculation, we had a total of 88 na-clauses.

(22) nu   hebist   **enin** der-n-<u>is</u>   din

now   have-SG.2 one   DEM-M.SG.NOM-NEG-is yours

'now, you are with someone who doesn't belong to you'

(Ch, 27)

The results of this search are summarized in Table 4:

	O > V	V > O
Definite	26 (72%)	10 (28%)
Indefinite	14 (70%)	6 (30%)

Table 4. VO/OV order versus definiteness of antecedent. Fisher Exact *p*: 1, Cramér's V: 0.02

The contingency table above clearly shows no substantial difference between relative clauses with a definite antecedent and those with an indefinite one. In fact, the Fisher Exact and Cramér's V confirm this result. For our corpus, there is probably no correlation between definiteness and verb position.

SPECIFICITY OF THE REFERENT. When we talk about specificity, we refer to whether a referent can be identified or not in a certain context. The following example can illustrate the point:

(23) I am looking for a woman.

In this simple sentence, "a woman" is ambiguous between two possible readings. The first reading is the specific one, i.e. the one in which I am looking for a certain woman – say Mary –, whom I met before. The second reading is the non-specific one, in which for example, I am telling a friend that I would like to have a girlfriend or a wife.
When considering an expression that is modified by a relative clause, specificity does not only rely on the antecedent, but also on the content of the relative clause. This is shown in the following examples, where the relative clause disambiguates between the specific and the non-specific reading:

(24) a. I am looking for a woman that I met yesterday.
     b. I am looking for a woman that would like to marry me.

Thus, the specificity of the referent cannot be only determined by the semantics of the antecedent. It also depends on the content of the relative clause.

The specificity – in combination with definiteness – seems to play an important role in certain relative clauses in German, namely in those displaying a V2 order. For PDG, Gärtner (1998, 2001) shows that V2 relative clauses can only modify an indefinite antecedent with a specific reading, as illustrated by the following examples taken from Gärtner (2001: 119):

(25) a. Hans möchte einen Fisch fangen (/), [den   er essen kann].[30]
        Hans wants   a   fish   catch   DEM-M.SG.ACC he eat   can

            'Hans wants to catch a fish that he can eat.'

     b. *Hans möchte einen Fisch fangen (/), [den <u>kann</u> er essen].

     c. Hans möchte einen Fisch fangen (/), [der   <u>taucht</u> gerade].
        Hans wants   a   fish   catch   DEM-M.SG.NOM is.diving   at the moment

In (25a), we see the case of an indefinite antecedent, which has a non-specific reading due to the semantics of the following relative clause. The modifying relative clause displays a verb-final pattern. The example in (25b) shows the ungrammaticality of the first sentence if the verb is placed in the second position of the relative clause. However, if we modify the indefinite antecedent by means of a relative clause that renders the referent specific, then a relative clause with a V2 pattern is available, as shown in (25c).

Similar observations on earlier stages of the language were made by Axel-Tober (2012: 207ff). Among others she illustrates it by means of example (6), repeated here as (26):

(26) sum   tuomo uuas In sumero burgi | [ther   ni-<u>forhta</u>   got]
     certain judge was in certain town   DEM-M.SG.NOM NEG-feared god

     Iudex quidam erat In quadam ciuitate | qui deum non timebat

         'There was a certain judge in a certain town who didn't fear god'

     (T 200, 31, cited in Axel-Tober 2012: 208)

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[30] The symbol (/) means that a high boundary tone precedes the relative clause. This is particularly important in those cases that are ambiguous between a relative clause and a main clause interpretation. Apart from syntax, prosody too has a disambiguating effect.

Nonetheless, we should point out that, for earlier stages of the language, the position of the verb with respect to the object was influenced by other factors, as already noticed. Thus, in a generative framework, we cannot exclude that, in the example above, it is the object – and not the verb – that moved.

All these considerations led us to annotate specificity too and to assess its role in determining the position of the verb. Below, we will show the results on specificity. In the next section, we will show the results of the interaction of definiteness and specificity.

With respect to specificity, we have both examples for specific (27) and non-specific referents (28):[31]

(27) einer got   almahtig der   <u>scuof</u> himil   enti erda
      a   God almighty Dem-M.Sg.Nom created heaven and earth

      'an almighty God who created heaven and earth'

    (BB, 2)

(28) neouuihtes,   des[32]   e   tages   gitan   <u>si</u>
      nothing-Gen   Dem-N.Sg.Gen before day-Gen done   is-Subj

      'nothing that is made before daybreak'

    (BR1, 13)

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[31] A typical example ambiguous between specific and non-specific reading is that of the formulaic language used for confession, as in the following case, where the penitent confess to both specific and non-specific (only potential) sins:

(i) alles (…) des   ih uuizzanto <u>kiteta</u> eddo unuuizzanto, notak   eddo
    all-Gen Dem-N.Sg.Gen I aware   did   or   unaware   coerced or

    unnotak,   slaffanti eddo uuachenti:
    uncoerced sleeping   or   waking

      'everything I did, aware or unaware, coerced or uncoerced, sleeping or waking:'

    (AB, 4)

More generally, we had 86 na-cases.

[32] This could be a case of attraction (see fn. 25) or a partitive reading of the genitive case.

The following confusion matrix illustrates the distribution of VO/OV orders in relation to the (non-)specificity of the referent:

	O > V	V > O
Non-specific	13 (87%)	2 (13%)
Specific	29 (67%)	14 (33%)

Table 5. VO/OV order versus specificity. Fisher Exact p: 0.19, Cramér's V: 0.19

Even though the data show a preference for the OV pattern in both cases, the VO order is much more frequent in specific cases than in non-specific ones. Notice however that the Fisher Exact test yields a p-value that is statistically not significant (given the typical α-level of 0.05). Thus, we cannot conclude that specificity alone is to be considered as a factor triggering the VO order.

INTERACTION OF DEFINITENESS WITH SPECIFICITY. Let us now consider the interaction of definiteness and specificity. We have shown that at least in PDG, this interaction appears to influence the position of the verb in a relative clause. The following table shows the frequency distribution of the relative clauses across the three variables simultaneously.

		O > V	V > O
Non-specific	Definite	5 (71%)	2 (29%)
	Indefinite	5 (100%)	0 (0%)
Specific	Definite	21 (72%)	8 (28%)
	Indefinite	8 (57%)	6 (43%)

Table 6. VO/OV order vs. definiteness and specificity. Fisher Exact p: 0.39, Cramer's V: 0.25

We should point out that the small amount of data in each cell calls for caution in their statistical interpretation. Even though the Fisher Exact test shows no statistical significance, Cramer's V indicates a moderately strong association between the variables. A tendency is clear if we compare Table 5 with Table 6. While definiteness seems to remain untouched by the specificity vs. non-specificity of the referent, we cannot say the same for indefiniteness, which shows an absolute preference for the OV order in the case of non-specific referents. While in our corpus,

no case for non-specific indefinites with VO order is provided, nearly half of the cases for specific indefinites display that order. This fact seems to be in line with the observations in Gärtner (1998, 2001) and Axel-Tober (2012: 207ff) on V2 relative clauses in PDG and in earlier stages of the language.

We can visualize the relationship between these parameters in a so-called "mosaic plot":
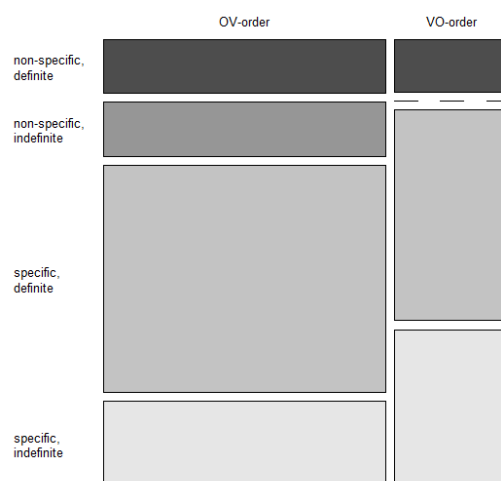

Figure 1. VO/OV order versus definiteness and specificity

Despite the small size of the data, the mosaic plot shows a very interest pattern with respect to the influence of the definiteness of the antecedent and the specificity of the referent. In particular, we can observe what follows:

1. The VO/OV orders are by no means affected by the ratio of definite vs. indefinite antecedents, which is almost identical in both cases.

2. Specificity seems to play a fundamental role in OV orders, but it has an even stronger influence with respect to VO orders. In VO cases, non-specific indefinite referents are absent in our corpus. VO cases correlate more strongly with specificity of the referent than OV cases. Not only definite specific referents trigger VO orders, but also indefinite specific ones.

3.4. RESTRICTIVITY. Several studies indicate that the types of relative clauses influence their phono-syntax, semantics, illocution, and information structure (cf. Holler 2005: 25ff). For the sake of our investigation, we distinguish between appositive (29) and restrictive (30), but we also annotated a third type – free relative clauses (31) – separately:[33]

(29) usere liuti   alte anti frote dea   érhina <u>warun</u>
      our   people old and wise DEM-M.PL.NOM before were

      'our old and wise people who were here before'

      (H, 15)

(30) ni-inpiize   des   eies   des[34]   in demo tage gilegit <u>si</u>
      NEG-eat-SUBJ the-GEN egg-GEN DEM-N.SG.GEN at the   day   laid   were

      'He should not eat an egg which is laid at the same day'

      (BR1, 15)

(31) Ther   <u>trinkit</u> thiz uuazzer be demo   thurstit inan mer
      DEM-M.SG.NOM drinks this water   by DEM-N.SG.DAT thirsts him more

      'Whoever drinks of this water shall thirst again'

      (Ch, 18)

With respect to information structure, Holler (2005: 68) – among others – points out that in contrast to restrictive relative clauses, appositive relative clauses are not integrated in the focus-

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[33] There are also some unclear clauses annotated as *na*. Given the ambiguity of *dar*, the relative clause in fn. 25 – repeated below – could receive a restrictive or an appositive interpretation:

(i) Denne verit er ze deru mahalsteti, deru   dar   kimarchot <u>ist</u>
    then   goes he to the court place DEM-F.SG.DAT there/ PART.REL marked   is

      'Then, he goes to the court place that is designated for this / which is delimited there.'

   (M, 77)

In this case, we had 69 na-clauses.

[34] This is another case of attraction or partitive genitive. See fn. 32.

background-structure of the hosting clause and that they thus build an information unit of their own (cf. Section 3.1).

If this also holds in OHG, we would expect for restrictive clauses to display a much more limited information-structural potential with respect to appositive clauses. Our expectations are twofold:

1. If the VO order is often associated with focus of the object, then appositive relative clauses should allow this order more liberally than restrictive clauses.

2. If a higher illocutionary and information-structural potential typically finds realization in V2 structures, then we would expect for appositive relative clauses to display this order more frequently than restrictive ones.

Both points lead us to expect a higher frequency of VO associated with appositive relative clauses. This hypothesis is borne out in our data.

The underlying question was: Is there a specific word order for each type of relative clause, or is the variation in the VO/OV order not influenced by the type? In order to test this, we compared the types of relative clauses with the VO/OV order (by excluding uncertain cases) and got the following contingency table:

	O > V	V > O
Appositive	7 (47%)	11 (53%)
Restrictive	32 (86%)	5 (14%)
Free	17 (85%)	3 (15%)

Table 7. VO/OV order versus type of restrictive clause. Fisher Exact $p < 0.001$, Cramér's V: 0.46

The Fisher Exact test finds a (non-surprising) p-value of 0.0006,[35] which is much smaller than the usual α-level of 0.05. This strongly significant (p < 0.001) correlation indicates that VO/OV order is very unlikely to be only randomly related to the type of relative clause. Cramér's V is

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[35] As a reminder, this indicates that the chance of finding the given distribution of VO/OV order over the relative clause types when assuming no relationship between these two factors would be less than a tenth of a percentage. In other words, it is very unlikely to find the current distribution if the two factors were unrelated.

0.46, which is generally considered to be indicative of a very strong association between VO/OV order and relative clause type.[36]

As to the question whether the VO/OV pattern is influenced by the type of the relative clause, Table 7 clearly shows that the answer can be answered positively. The postverbal position of the object is clearly much more frequent in appositive clauses, which in fact seems to correlate with their peculiar illocutionary and information structure. As discussed above (also cf. Holler 2005: 58ff), appositive relative clauses are characterized by an independent illocutionary force and information structure. They differ from restrictive relative clauses, which typically depend on the matrix clauses both for their illocutionary force and information structure. This explains the different realization of (possibly focused) postverbal objects in the two types, namely appositives and restrictives.

Notice that free relative clauses show a distribution that is almost identical to that of restrictive relative clauses. This is not surprising if we assume that free relative clauses are just a special type of restrictive relative clauses which lack an overt antecedent in the matrix clause.

In addition, we considered the position of the subject with respect to the verb in relation to the type of relative clause by looking at Table 8.[37]

	S > V	V > S
Appositive	7 (78%)	2 (22%)
Restrictive	31 (97%)	1 (3%)
Free	6 (100%)	0 (0%)

Table 8. SV/VS order versus type of relative clause. Fisher Exact p: 0.13, Cramér's V: 0.32

The absolute values in this contingency table are very low, yielding very unreliable percentages, and absolute caution should be applied when interpreting them. Nonetheless, it is, first of all,

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[36] If we consider the distribution of type of relative clauses in V2 vs. non-V2 orders, we get a result below the 0.05 threshold, which indicates statistical significance (Fisher Exact $p < 0.05$). Appositive relative clauses display V-late or V-end-orders in 22 cases, the V2 order in 12. In restrictive clauses the ratio is 70:3, while in free relatives it is 28:2. Number of na-cases: 7.

[37] Number of na-cases: 97.

obvious that the VS order is rare, which was already apparent from Table 2 (and related discussion). The Fisher Exact test returns a *p*-value of 0.13 indicating a 13% chance that this frequency distribution would have been observed if the type of relative clause were unrelated to the order of subject and verb. The related Cramér's V of 0.32 indicates a relatively strong association between the type of relative clause and the SV/VS order.

Table 8 shows that postverbal subjects are in general disfavored with respect to postverbal objects. This has probably to do with grammatical factors, colliding with information-structural ones. Although it is still possible to "extrapose" subjects in OHG main clauses, they tend to be excluded from this position not for information-structural reasons, but rather for syntactic ones. [38]

4. CONCLUSIONS. In this study, we analyzed the properties of OHG relative clauses in a corpus of autochthonous texts. We discussed a number of aspects which are often described in the literature on OHG relative structures. In order to do this, we carried on a statistical research based on a modern corpus investigation. This is a desideratum in the field of historical linguistics.

Our aim was to examine the position of the finite verb with respect to its arguments, in particular to the object. Since the first written attestations, the typical order of subordinate clauses has been OV. Thus, our first question was: Do relative clauses line up with this general tendency? How often do they deviate from this pattern?

Then, we tested the factors that are reported or could be assumed to determine VO vs. OV patterns, such as:

- presence or absence of relative particles
- (in)definiteness of antecedence
- (non-)specificity of the referent
- type of relative clause – restrictive vs. appositive

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[38] Also see Coniglio & Schlachter (2015a, 2015b), in which it is shown that subjects of main clauses can still be "extraposed" in MHG, but they decrease in the following centuries. The present research shows that, in subordinate clauses instead, this grammatical restriction seems to operate earlier.

The presence of particles, which were not particularly frequent in our corpus, was shown to be not correlated with the distribution of VO/OV patterns. Furthermore, we tested whether the patterns depend on the definiteness of the antecedent or with the specificity of the referent or with both properties simultaneously. However, no statistically significant results ensued.

Our research showed that only the type of relative clause (restrictive vs. non-restrictive) yields statistically significant results, which was linked to the different information-structural properties of restrictive and appositive relative clauses.

PRIMARY TEXTS

AB   Altbairische Beichte, in: Die kleineren althochdeutschen Denkmäler, ed. Elias Steinmeyer, Berlin 1916 (reprinted Dublin/Zurich 1971), 309.

BB   Bruchstück einer Beichte, in: Die kleineren althochdeutschen Denkmäler, ed. Elias Steinmeyer, Berlin 1916 (reprinted Dublin/Zurich 1971), 326/327.

BR1   Basler Rezepte 1, in: Die kleineren althochdeutschen Denkmäler, ed. Elias Steinmeyer, Berlin 1916 (reprinted Dublin/Zurich 1971), 39–42.

Ch   Christus und die Samariterin, in: Die kleineren althochdeutschen Denkmäler, ed. Elias Steinmeyer, Berlin 1916 (reprinted Dublin/Zurich 1971), 89–91.

DD   De definitione, in: Die kleineren althochdeutschen Denkmäler, ed. Elias Steinmeyer, Berlin 1916 (reprinted Dublin/Zurich 1971), 118–120.

H   Hildebrandslied, in: Die kleineren althochdeutschen Denkmäler, ed. Elias Steinmeyer, Berlin 1916 (reprinted Dublin/Zurich 1971), 1–15.

HiH   Himmel und Hölle, in: Die kleineren althochdeutschen Denkmäler, ed. Elias Steinmeyer, Berlin 1916 (reprinted Dublin/Zurich 1971), 153–155.

L   Ludwigslied, in: Die kleineren althochdeutschen Denkmäler, ed. Elias Steinmeyer, Berlin 1916 (reprinted Dublin/Zurich 1971), 85–88.

M   Muspilli, in: Die kleineren althochdeutschen Denkmäler, ed. Elias Steinmeyer, Berlin 1916 (reprinted Dublin/Zurich 1971), 66–81.

MF   Monseer Fragmente, ed. Hench, George A. (1890), Straßburg.

MB   Mainzer Beichte, in: Die kleineren althochdeutschen Denkmäler, ed. Elias Steinmeyer, Berlin 1916 (reprinted Dublin/Zurich 1971), 329–331.

T   Die lateinisch-althochdeutsche Tatianbilingue Stiftsbibliothek St. Gallen Cod. 56, ed. Achim Masser, Göttingen 1994.

TV   Trierer Verse, in: Die kleineren althochdeutschen Denkmäler, ed. Elias Steinmeyer, Berlin 1916 (reprinted Dublin/Zurich 1971), 399/400.

WK   Weissenburger Katechismus, in: Die kleineren althochdeutschen Denkmäler, ed. Elias Steinmeyer, Berlin 1916 (reprinted Dublin/Zurich 1971), 29–18.

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APPENDIX A. INFORMATION ON ANNOTATION AND TAGS

As to this study, we benefited from the data set provided by the project Old German Reference Corpus. OGRC includes annotated versions of all Old High German and Old Low German texts. The annotation encompasses – amongst others – lemmatization, word classes and morphological annotation. There are no syntactic comments using treebank annotation. Nevertheless, some specific syntactic information is recorded using a simple linear schema, which allows searches for certain clause types, such as for relative clauses.

Due to the fact that treebanks are excluded from annotation, no syntactic dependencies can be shown except using tags for e.g. object clause, subject clause, adverbial clause, etc. For some special cases, different annotation tiers were combined in order to give an easy and pragmatic way to find these constructions in the database. Thus, free relatives which function as object or subject arguments in the main clause are tagged as subject clauses and object clauses, respectively, and the clause introducing element is marked as a relative pronoun, as expected. This leads to the strange fact that these relatives are annotated as argument clauses introduced by a relative pronoun, but, on the other hand, the advantage is that one is able to find these – and only these – free relatives in a very simple way.

Our study bases on a dataset which were created on the basis of the following queries in OGRC database:[39]

a. Relative clauses

```
clause=/CF.*_[IU]_Rel/
```

b. Free relatives that function as arguments

```
clause=/CF_I_(O|S)/&pos=/DDSREL/&#1_l_#2
```

c. Main clauses introduced by a substituting demonstrative

```
clause=/CF_U_M /&pos=/DDS/& #2_l_#1
```

---

[39] See http://korpling.german.hu-berlin.de/annis3/ddd/ for details on Annis Query Language (AQL). Annotation tags used in the queries: CF = clause finite; DDS = determiner, demonstrative, substituting; DDSREL = determiner, demonstrative, substituting, relative; I = introduced; M = main; O = object; Rel = relative; S = subject; U = unintroduced.

APPENDIX B. QUANTITATIVE TECHNIQUES

1. FREQUENCY DISTRIBUTIONS AND CONTINGENCY TABLES. The most widely known and used descriptive data analytics technique, which is also applied here, is the calculation of a frequency distribution and the calculation of a contingency table. Frequency distributions show how frequent a specific value of a variable occurs with respect to the other variables. A contingency table is a multi-dimensional version of a frequency distribution. Whereas a frequency distribution is one-dimensional, in the sense that it only represents the frequencies of the values of a single variable, a contingency table shows the frequency distribution of one variable in the context of the values of other variables (typically, one other variable).

2. FISHER EXACT TEST AND CRAMÉR'S V. We also applied two statistical techniques, i.e. the Fisher Exact Test and the calculation for Cramér's V. The Fisher Exact Test is an inferential statistical technique that can tell us more about the correlation between two variables (as captured in a contingency table) by means of a p-value. The Fisher Exact Test can be used to test the null hypothesis that two factors, as presented in a contingency table, are unrelated, just like the more widely known Chi squared test. The rationale for such tests is a two-step process. Step 1: expected values for the contingency table are calculated under an assumption that the two factors are unrelated, e.g. the frequency distribution of letters is equal in all paragraphs. Step 2: the actually observed frequencies in the contingency table are compared to the expected frequencies. On the basis of this comparison, the deviation between the observed and expected frequencies is used to calculate a p-value. The p-value expresses the probability of having the observed frequencies under the assumption that the factors are unrelated. Typically, a probability smaller than 5% (often written as 0.05) is considered to be small enough to reject the assumption that the factors are unrelated. As a final remark, we point out that a Fisher exact test and the Chi squared test are conceptually alike, in the sense that they provide a p-value that needs to be interpreted as shown above. A Fisher Exact Test is typically applied in the case of low absolute values (more precisely, a rule of thumb is to apply the Fisher Exact Test when at least one of the expected frequencies is smaller than 5).

Cramér's V captures the effect size of a correlation, which is different from a *p*-value, in the sense that it gives an estimate of the "strength" of the correlation, rather than the "probability" of the correlation as expressed by a *p*-value.

APPENDIX C. R CODE USED

The following R code was used in this paper for the quantitative analysis, the inferential statistics and the visualization.

```
# load required package
library(vcd)
# set working directory
setwd("C:/path/to/dataset/")
# read in dataset
ds = read.delim('dataset.tab', header=T, sep='\t', row.names=NULL)
### Section 3.1
# distribution of object/predicate in front of verb versus object/predicate after the verb
table(ds$object.verb)
# distribution of subject in front of verb versus subject after the verb
table(ds$subj.verb)
### Section 3.2
# contingency table verb/object order and presence of relative particle
table(ds$particle, ds$object.verb)
# fisher exact test and cramer's V test
fisher.test(cbind(c(9,50), c(3,16)))
assocstats(rbind(c(9,50), c(3,16)))$cramer
### Section 3.3
# contingency table verb/object order and definiteness of antecedent
table(ds$ac_definite, ds$object.verb)
# fisher exact test and cramer's V
fisher.test(cbind(c(26,14),c(10,6)))
assocstats(cbind(c(26,14),c(10,6)))$cramer
# contingency table verb/object order and specificity
table(ds$ac.relclause_specific, ds$object.verb)
# fisher exact test and cramer's V
fisher.test(cbind(c(13,29),c(2,14)))
assocstats(cbind(c(13,29),c(2,14)))$cramer
# contingency table verb/object order and definiteness + specificity
ftable(ds$object.verb ~ ds$ac.relclause_specific + ds$ac_definite)
# get the data
ov = c(5,5,21,8)
vo = c(2,0,8,6)
ov.vo = cbind(ov, vo)
colnames(ov.vo) = c('OV-order', 'VO-order')
rownames(ov.vo) = c('non-specific,\ndefinite',
                    'non-specific,\nindefinite',
                    'specific,\ndefinite',
                    'specific,\nindefinite')
# mosaicplot
mosaicplot(t(ov.vo), las=1, color=TRUE, main='', cex.axis=0.8)
# inferential stats
fisher.test(cbind(ov,vo))
assocstats(cbind(ov,vo))
### Section 3.4
# contingency table verb/object order and type of relative clause
table(ds$type, ds$object.verb)
# fisher exact test and cramer's V
fisher.test(cbind(c(7,32,17),c(11,5,3)))
assocstats(cbind(c(7,32,17),c(11,5,3)))$cramer
# contingency table verb/subject order and type of relative clause
table(ds$type, ds$subj.verb)
# fisher exact test and cramer's V
fisher.test(cbind(c(7,31,6),c(2,1,0)))
assocstats(cbind(c(7,31,6),c(2,1,0)))$cramer
```