

# Quantificational variability and the genesis of English headed *wh*-relatives

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**Abstract.** English headed *wh*-relatives developed from Old English free *hw*-relatives, but many descriptive grammars associate free *hw*-relatives primarily with generalizing interpretations quite unlike the standard semantics for headed relatives. We demonstrate that these generalizing interpretations are reducible to factors external to the free relative itself, and that these external factors are less common with clause-final free *hw*-relatives. Clause-final free *hw*-relatives are more likely to be interpreted as definite, which brings them closer to typical interpretation of headed relatives.

**Keywords:** Old English, free relatives, semantic change.

## 1. Introduction

Many principles of linguistic change which have been worked out in some detail for phonology or syntax should apply equally to semantic change. For example, it is well-established that the surface manifestations of phonological and syntactic changes tend to be gradual and incremental — a theory that predicted catastrophic syntactic change to be common would be generally considered a nonstarter. Exactly the same should be true of theories of semantic change.

Most analyses of gradual grammatical change incorporate the notion of **reanalysis** (Andersen 1973, Lightfoot 1979). Reanalysis is useful to analysts in that it builds on the notion of latent structural ambiguity, or the availability of multiple analyses of a given form, to allow substantial structural change paired with minimal change on the surface. A learner can associate a new structure with a given string, and that new structure may subsequently be used in novel ways.

Given the general requirement that natural language grammars be interpreted compositionally, an instance of syntactic reanalysis typically requires a parallel semantic reanalysis: a change in the way in which a lexical item interacts with the syntactic compositional system requires a change in the way in which it interacts with the semantic compositional system. This imposes a constraint on theories of grammatical change: we assume that semantic change, like other types of grammatical change, is typically gradual and incremental, so a good analysis of grammatical change does not entail catastrophic semantic change.

In this paper, we discuss a change in the history of English, namely the development of headed *wh*-relatives in Early Middle English. We propose a natural syntactic explanation for this change, according to which an appositive free relative is reanalysed as an extraposed headed relative.

However, given common assumptions about the semantics of Old English *wh*-words, this natural syntactic explanation entails a catastrophic semantic change: the ‘indefinite’ or ‘general’ meanings classically associated with OE *wh*-words are quite remote from the role of *wh*-phrases within a compositional interpretation of headed relatives.

We show that, in this case, the straightforward syntactic analysis can be maintained once closer attention is paid to the division of labour between factors internal and external to the relative clause in the compositional derivation of the meaning of free relatives. Any ‘general’ interpretation of OE free relatives is not due to the inherent meaning of the *wh*-form, but rather to sensitivity to external factors like the episodic/generic distinction (Jacobson 1995, Dayal 1997) and association with *swa* (similar to Present-Day English *-ever* as analysed by Dayal and by von Stechow 2000).

The point is not to reduce the semantic change to zero, but to avoid real diachronic discontinuities (which often translate into arbitrary synchronic disjunctions) in the interpretation of a form. In fact, we will argue that the development of English headed relatives involves a case of **semantic reanalysis**: a large change in the semantic structure associated with a given utterance, which has only a minimal effect on truth-conditional interpretation. Semantic reanalysis, construed in this way, requires a many-to-one relation between structured semantic representations and truth-conditional interpretations, and so contributes another argument for structured semantic representations.

In what follows, Section 2 sketches relevant aspects of the emergence of headed *wh*-relatives, and Section 3 briefly discusses key ideas emerging from Jacobson’s analysis of free relatives which underpin our examination of OE free relative semantics. After an interim summary in Section 4, Section 5 describes a quantitative analysis of OE free relatives, and Section 6 concludes.

## 2. The diachrony of English relatives: Classical accounts

Old English used *hw*-phrases (the ancestors of *wh*-phrases) in three ways: as NPI-like restricted indefinites (1); as interrogative forms (2); and within free relatives (3).

- (1) and gif **hwa** hyt bletsað, þonne ablinð seo dydrung.  
and if who it blesses then ceases DEM illusion  
‘And if anyone blesses it, then the illusion is dispelled.’ (coaelhom,+AHom\_30:4.4082)
- (2) Saga me on **hwilcne dæg** he gesingode  
Say me on which day he sang  
‘Tell me which day he sang on.’ (coadrian,Ad:2.1.4)

- (3) [eal swa **hwæt** swa ic þe gehet] [eal ic hit gesette]  
 all so what so I thee promised all I it appoint  
 ‘Whatever I promised you, I will do it all.’  
 (coblick,LS\_20\_[AssumptMor[BiHom\_13]]:147.155.1807)

Our focus in this paper is on the development of a fourth use of *hw*-phrases, in headed relatives. Headed relatives in Old English were formed with either a demonstrative phrase in [Spec,CP] (4), a complementizer *þe* in  $C^0$  (5), both, or neither. A demonstrative phrase is associated with a gap from several categories, including PPs and adverbials; if there is no demonstrative phrase, the gap inside the relative clause is always of category NP (Allen 1980).

- (4) he is ure lif [on **þam** we lybbað & styriað \_\_\_]  
 he is our life in DEM we live and move  
 ‘He is our life, in whom we live and move.’ (coaelhom,+AHom\_1:280.148)
- (5) ic [ðe \_\_\_ to eow sprece]  
 I that to you speak  
 ‘I, that speaks to you.’ (coaelhom,+AHom\_1:63.45)

As the OE inflectional system collapsed, examples like (4) disappeared, leaving *þe* as the primary relativizer. This makes it tempting to hypothesize a functional motivation for the introduction of *wh*-relatives: *þe* can only be associated with an NP gap, but *wh*-phrases come in the same range of categories as inflected demonstrative phrases. This approach might hope to explain the fact noted by Romaine (1982), that headed *wh*-relatives appear first with *wh*-AdvPs and *wh*-PPs, low-accessibility *wh*-phrases in the terms of Keenan and Comrie (1977). However, as already noted by Allen, the chronology does not support a functional motivation: relatives headed by inflected demonstratives largely disappeared several decades before headed *wh*-relatives emerged, and during those decades, English seemed to get on fine with just *þe*. Accordingly, we will not consider functional pressures here, and concentrate instead on formal factors influencing the emergence of headed *wh*-relatives.

A full theory of a change like this typically starts with identification of an ambiguous context in which reanalysis can take place. One such context was noted already by Johnsen (1913), who demonstrated a potential ambiguity between headed *wh*-relatives and free relatives in apposition to universal *eall*. We build on Johnsen’s insight, although we will show that free *hw*-relatives are found in apposition to a range of NPs, not just *eall*. Supplementing Johnsen’s insight, we note that OE free *hw*-relatives almost always occur in peripheral positions within the clause, either left-adjoined or clause-final (except for other peripheral elements such as certain adverbial phrases). Early headed *wh*-relatives, meanwhile, are always clause-final, although they may stand in an extraposition-like relation to a clause-medial antecedent.

Taken together, these considerations mean that free and headed *wh*-relatives overlap in that they can both occur clause-finally, with a *wh*-phrase in [Spec,CP], and an anaphoric relation to a preceding constituent. (6) illustrates this context. It contains two sentences, the second containing a clear free *hw*-relative *hwar ic hine byrede*. However, the first is ambiguous: either *hwar ic þe leigde* is a free relative in apposition to *þa byrigeles* (two separate noun phrases), or it is a headed relative modifying *þa byrigeles* (a single complex noun phrase). This is the latent structural ambiguity required for reanalysis.

- (6) Ða cwæð ic to him, æteowe me þa byrigeles [hwar ic þe leigde]. Se Hælend me  
Then said I to him show me the tomb where I you laid The Saviour me  
þa beo þære rihthand genam and me ut lædde [hwar ic hine byrede]  
then by the right hand took and me out led where I him buried  
'Then I said to him, "Show me the tomb where I laid you". The Saviour then took me by  
the right hand and led me out to where I buried him.' (conicodC,Nic\_[C]:149.161–2)

We can only see clearly that reanalysis has taken place once distributional differences arise between the constructions in question. In this case, this arises once *wh*-relatives occur within clause-medial NPs, as in (7). Such examples are unattested until the mid-13th century, and then gradually increase in frequency over several centuries.

- (7) For [þe eareste Pilunge [hwer of al þis uel is]] nis buten of prude.  
for the first stripping where of all this evil is NEG.is but of pride  
'For the first stripping, from where all this evil comes, is from nothing but pride.'  
(cmancriw-1,II.119.1506)

Free and headed *wh*-relatives also have overlapping but distinct internal composition. An OE free *hw*-relative maximally contains a CP-layer like (8), with the paired elements *swa* . . . *swa* surrounding the *wh*-phrase *hwylcen dæige*, with a piedpiped preposition.

- (8) [CP [PP on [NP swa hwylcen dæige]] [C swa] se synfulle gecerred byð to Gode]  
on so which day so the sinful turned be to God  
'On whichever day the sinner is turned to God.' (coalcuin,Alc\_[Warn\_35]:393.290)

The paired *swa*-forms are only found in free *hw*-relatives in OE and early ME, and never in headed relatives. We will examine their distribution among subtypes of free *hw*-relatives below.

In sum, from a syntactic perspective, OE free *hw*-relatives are ripe for reanalysis as headed relatives: they have overlapping distributions, similar internal syntax, and both allow for an anaphoric relation to a preceding phrase. Our main task in this paper is to fill in the semantic half of this reanalysis, and draw out the implications for the interpretation of free and headed *wh*-relatives during this period.

As discussed in the introduction, OE free *hw*-relatives frequently have a ‘general’, or broadly universal interpretation. This is certainly in evidence in (3). However, the crucial question is not so much how (3) is interpreted *in toto*, but how that meaning is derived compositionally, and what the contribution of *hwæt* is to that derivation. In (3), there are clear reasons to suspect that the general interpretation is not due to the semantics of *hwæt* alone: both the free relative and the matrix clause contain the overtly universal *eal*. Indeed, given that natural language prohibits vacuous quantification, it would be surprising if *hwæt* could co-occur with *eal* at all if it had a robustly universal interpretation. This is an initial indication that factors other than the *hw*-forms may contribute the general interpretation associated with free *hw*-relatives.

A related argument was already made by Curme (1912), in a passage which deserves to be quoted at length:

‘This change of meaning from a general conception to a particular reference must have been made more easy by **the use of “seþe” with the general meaning *he that, whoever***: “Seþe gelyfþ on me, he wyrþ þa wearc þe ic wyrce” (John 14.12, Corpus) “He that believes on me (he) will do the works that I do.” The relative “seþe,” which usually follows an antecedent, and thus refers to a definite individual, here stands at the beginning of the sentence just as the general relative “swa hwylc swa” and like it has a general meaning. Thus the same form has a general and a particular meaning. Similarly the general relative “swa hwylc swa” passed from the head of the sentence to a position after a definite antecedent and took on definite meaning, for after the analogy of “seþe” it could have both general and definite force. . . **[T]he meaning of “swa hwylc swa” and “seþe” or “se” was identical[.]**

(Curme 1912:196, emphasis added)

Curme’s argument complements our discussion above. We showed that *hw*-phrases, unlike true universals, can occur as the restriction of universal *eal*, while Curme shows that the clearly non-universal demonstrative *se* can share the general interpretation found with *hw*-relatives. Moreover, the free relative in (6) has a clearly definite interpretation, as revealed by the interpretive relation between the NPs in the two clauses, in contrast to the general interpretation of (3). Taken together, these pieces of evidence strongly suggest that the general interpretation is not due to the lexical semantics of the *hw*-forms.

In this way, Curme’s analysis foreshadows modern semantic analyses, stemming from Jacobson (1995), of free relatives as definite descriptions. We summarize that body of work in Section 3.

### 3. Formal semantics of free relatives

The questions about the quantificational force of OE free relatives that occupied us in Section 2 have also been asked of Present-Day English. It is widely agreed that the free relative in (9) is a definite description, paraphraseable as *the thing(s) that he cooked*.

(9) I ate [what he cooked].

However, it is less clear whether (10) is definite or universal.

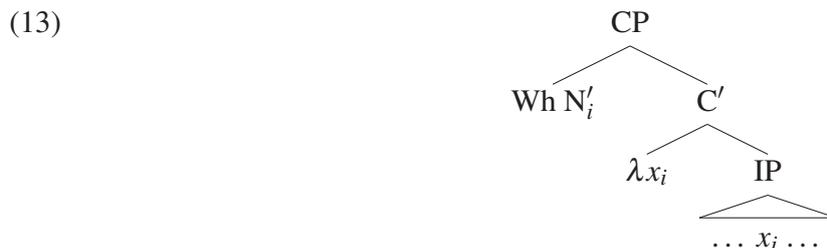
(10) I ate [whatever he cooked].

The commonsense answer appears to be that *whatever he cooked* is universal, as (10) can be paraphrased as *I ate everything that he cooked*. Specific technical arguments in favour of this view do exist: Larson (1987) argues that free relatives with *-ever*, unlike definites, undergo Quantifier Raising, while Iatridou and Varlokosta (1998) claim that free relatives with *-ever* are ungrammatical in specificational pseudoclefts because they are universal, while specificational sentences are built from definites. However, the pre-eminent current theory of free relatives, stemming from Jacobson (1995), claims that the free relative in (10), like (9), is definite. Jacobson's core argument is that universal-like interpretations are doubly dissociated from the presence of *-ever*. In (11), *-ever* is present but there is no universal interpretation (the free relative can be paraphrased as *the movie the Avon is now showing — I forget what it is*). Meanwhile, in (12), *-ever* is absent but the meaning is general: if the babysitter tells you to do something, do it.

(11) Everyone who went to [whatever movie the Avon is now showing] said it was very boring.  
(Jacobson 1995:454)

(12) Do [what the babysitter tells you] (Jacobson 1995:455)

Jacobson takes this as evidence that *what* and *whatever* are both definite descriptions, with their denotation differing from that of *the N(s)* primarily in that *what* is number-neutral and can refer to atomic individuals or pluralities. To make this slightly more explicit, assume a lattice structure for the domain of individuals as in Link (1983), and an internal syntax for free relatives as in (13).



The claim in its essentials is that  $C'$  denotes  $\lambda x.P(x)$ , and that  $Wh N'$  denotes  $\lambda P \iota x.P(x) \wedge Q(x)$ , where  $Q$  is the property denoted by  $N'$ . The free relative as a whole then denotes  $\iota x.P(x) \wedge Q(x)$ , the maximal individual bearing the properties described by  $N'$  and  $C'$ .

The take-home message from Jacobson's double dissociation is that apparently universal interpretations of free relatives cannot be reduced to the presence of *-ever*. Two subsequent papers

addressed obvious questions arising from this. First, Dayal (1997) showed that a key determinant of whether a free relative is interpreted as ‘definite’ or ‘universal’ is the external linguistic context: if the clause containing the free relative is interpreted episodically ((14-a) and (15-a)), the free relative is interpreted as definite; if it is interpreted generically ((14-b) and (15-b)), the free relative is interpreted as universal.

- (14) a. Do [what the babysitter told you].  
 b. Do [what the babysitter tells you].
- (15) a. Everyone who went to [whatever movie the Avon was showing] said it was very boring.  
 b. Everyone who goes to [whatever movie the Avon is showing] says it is very boring.

Dayal takes this to show that the denotation of free relatives should be relativized to situations: they denote the maximal entity bearing properties  $P$  and  $Q$  in some situation  $s$ . Episodic sentences are descriptions of particular situations, which means that free relatives in such sentences pick out a particular individual. Generic sentences, meanwhile, involve generic quantification over situations, and accordingly, free relatives will pick out different individuals in different situations.

Finally, von Stechow (2000) addresses the contribution of *-ever*, if it is not a universal quantifier. He claims that *-ever* contributes a presupposition given in (16). In somewhat plainer English, the presupposition states that, within some set of worlds, regardless of the identity of the maximal individual picked out by the free relative, the state of affairs described by the rest of the sentence would have been the same.

- (16)  $whatever(w)(F)(P)(Q)$   
 a. presupposes:  $\forall w' \in \min_w [F \cap (\lambda w'. \lambda x. P(w')(x) \neq \lambda x. P(w)(x))]$  :  
 $Q(w')(\lambda x. P(w')(x)) = Q(w)(\lambda x. P(w)(x))$   
 b. asserts:  $Q(w)(\lambda x. P(w)(x))$  (von Stechow 2000)  
 Where  $w$  is a variable over worlds,  $F$  is a modal base,  $P$  is the free relative denotation,  $Q$  is the predicate of which the free relative is an argument.

Depending on the choice of modal base, this presupposition tends to be interpreted in one of two ways. (17) presupposes that the speaker is ignorant of what Arlo is cooking. In the terms of (16), Arlo is cooking different dishes in different doxastically accessible worlds, but those different dishes have the common property that there’s a lot of garlic in them.

- (17) There’s a lot of garlic in [whatever Arlo’s cooking] (#in this case, porridge).

Meanwhile, in (18), the speaker is indifferent to the identity of the tool. The relevant modal base is roughly a set of worlds which differ minimally from the real world only in the identity of the tool which is handy: in each of those worlds, I grabbed that tool.

(18) I grabbed [whatever tool was handy] (in this case, a hammer).

This completes the analytical separation of *-ever* from universality: we have a different causal explanation for universal readings, and a non-universal compositional contribution of *-ever*. In what follows, we argue that the definite analysis is equally applicable to OE, and that OE *swa* is semantically similar to *-ever*.

#### 4. Back to Old English

Section 3 described recent analyses which dissociate the role of *-ever* from universality. We now take these analyses back to our discussion of Old English. To recap, our question is whether OE free *hw*-relatives can be analysed as definite descriptions, using Jacobson's analysis of PDE free relatives as a model. It is important to note that many OE examples are equally compatible with analyses as universal quantifiers, but that is by the by: we should prefer an analysis of free relatives as definite descriptions *a priori*, as such an analysis fits better with Caponigro's (2003) findings about the crosslinguistic stability of free relative meaning, and also allows for a less discontinuous analysis of the diachronic semantics of *wh*-forms. The aim is not to falsify other conceivable analyses which treat some or all free *hw*-relatives as universals; it is to demonstrate that an analysis where they always denote definites is tenable, and to develop, on the basis of that demonstration, a diachronic account which does not rely on catastrophic semantic change to identify OE free relatives as the historical antecedents of Middle English headed relatives.

A major implication of Jacobson's and Dayal's work on free relatives is that we cannot draw reliable conclusions about quantificational force without controlling for interactions with operators external to the free relative. Accordingly, we conducted a quantitative investigation into patterns of use of free *hw*-relatives in the York–Toronto–Helsinki Corpus of Old English Prose (YCOE, Taylor et al. 2003). If free *hw*-relatives are definite descriptions, they should show the same range of interpretations as PDE free *wh*-(*ever*)-relatives. Based on the work described in Section 3, we can sharpen this into the following specific predictions.

- Apparently universal interpretations should be largely concentrated in generic sentences (though generic sentences may also admit non-universal interpretations).
- Any equivalent of *-ever* is compatible with such quasi-universal interpretations, but not required by such interpretations.
- Episodic sentences will tend to give rise to definite interpretations, with some exceptions.
- An equivalent of *-ever* in episodic sentences will trigger von Stechow's presupposition, typically construable as a presupposition of ignorance or indifference.

We explore these predictions in both quantitative and qualitative analyses in the next section. Before proceeding, we note that a certain amount of noise is ineliminable in work such as this: we do not have intuitions about OE meanings, and attempts to infer fairly subtle contrasts from overt contextual factors are invariably error-prone. Having said that, we believe that in this case, the surprising fact is that there is not more noise, and that fairly clear patterns can be detected.

## 5. Corpus analysis

In this section, we argue for four main conclusions: clause-final and clause-initial free relatives have different properties; clause-initial free relatives are not representative of free relatives in general, because they require *swa*; *swa* is a semantic equivalent of present-day English *-ever*, so only clause-final free relatives have interpretations other than those admitted by *-ever*; and free relatives without *swa* are particularly concentrated in adverbial free relatives.

To establish these conclusions, we extracted 503 free relatives (tagged with the CP-FRL tag) with a *hw*-phrase in [Spec,CP] from YCOE, and classified them according to four factors:

- Position of the free relative (left-peripheral or clause-final);<sup>1</sup>
- Grammatical function of the *hw*-phrase (argument or adverbial);
- Presence or absence of *swa* within the free relative;
- Tense of the main verbs in the free relative and matrix (past or present).

We intend simple present tense as a proxy for generic interpretation, and other tenses as proxies for episodic interpretation. This is clearly a very rough approximation of the actual linguistic facts, especially given that OE does not robustly display PDE's distinctive restrictions on interpretation of the simple present. However, it has the virtue of being explicitly represented in the textual record, while actual interpretation can only be indirectly inferred. Moreover, this simple approach produced very robust results, as will be shown presently.<sup>2</sup>

### 5.1. Results: Present tense

#### 5.1.1. Quantitative analysis

Most work on OE free relatives has tacitly assumed that the canonical OE free *hw*-relative is the generalizing variety with *swa* found in a correlative construction. In this section, we show that the properties of these free relatives are not shared by all free *hw*-relatives. We describe rates of present tense in free *hw*-relatives conditioned by clausal position and grammatical function, and show that,

<sup>1</sup>A token followed only by adjuncts and other peripheral material was classed as clause-final. On that definition, over 90% of free *hw*-relatives in YCOE occur in one of these two peripheral positions. We discarded the relatively rare clause-medial examples because of insufficient data to draw robust comparisons.

<sup>2</sup>It is somewhat surprising that this approach worked as well as it did. We believe that this may reflect a contingent fact about the types of discourses which are most strongly represented in the OE textual record, and in YCOE in particular. Narrative reports, whether historical or fictional, are predominantly episodic and reported in the past tense; other types of documents, such as laws and more philosophical works, tend to express generic propositions in the present tense. Although tense and genericity are doubly dissociable, then, in this corpus they correlate quite strongly.

in comparison to argumental free *hw*-relatives in correlative constructions, both clause-final and adverbial free *hw*-relatives use less present tense.

As a baseline, the tense of all verbs in the YCOE was examined. There are 89,027 present tense verbs (44.4%) and 111,545 past tense verbs (55.6%), as well as 33,967 others, such as imperatives or participles. In comparison, 354 main verbs in free *hw*-relatives (70.7%) are in the present tense, and 147 (29.3%) are in the past tense (2 tokens were excluded, one because it contained no verb and one because the main verb appeared to be an infinitive). On the assumption that rate of present tense reflects rate of generic interpretation, this confirms the impression that free *hw*-relatives are strongly associated with generic interpretation (binomial test,  $p < 2.2 \times 10^{-16}$ ).

However, there are significant differences in the strength of association of different classes of free *hw*-relative with present tense. Table 1 shows rates of present tense among free *hw*-relatives classified according to clausal position and grammatical function (9 tokens were excluded because either the tense or the grammatical function was unclear).

|                 | Argument        | Adverbial     |
|-----------------|-----------------|---------------|
| Left-peripheral | 82.7% (196/237) | 63.3% (31/49) |
| Clause-final    | 62% (101/163)   | 46.7% (21/45) |

Table 1: Rates of present tense in free *hw*-relatives

A logistic regression analysis revealed no significant interaction between position and grammatical function ( $p = 0.41$ ). Once the interaction was excluded from the model, there were highly significant main effects of position (left-peripheral position favours present tense,  $p = 1.7 \times 10^{-6}$ ) and grammatical function (argumenthood favours present tense,  $p = 7.8 \times 10^{-4}$ ).

In probing the applicability of the Jacobson/Dayal analysis of free relatives to OE, we are interested particularly in non-universal interpretations of free *hw*-relatives, as universal interpretations do not distinguish that analysis from an alternative where OE free *hw*-relatives are lexically specified as universal. We expect such non-universal interpretations to be most common in episodic sentences, expressed using tenses other than the simple present. The results summarized in Table 1 therefore strongly suggest that we should not focus on left-peripheral, argumental free *hw*-relatives, as the literature often has, but rather concentrate on clause-final and adverbial examples.

### 5.1.2. Qualitative analysis

A qualitative examination of a representative set of examples strengthens this impression. We discuss three cases: the standard case where present tense correlates with a universal interpretation; cases where a universal interpretation arises in a correlative construction despite the use of past

tense; and cases where present tense is associated not with a universal interpretation, but with another interpretation which *-ever* can also give rise to.

(19) exemplifies the straightforward case of Dayal's pattern, where simple present tense is paired with a habitual interpretation of the verbal predicates and general interpretation of the free relative. Clearly, *swa hwæt* could be translated as *whatever*.

- (19) and [swa hwæt swa we doþ Godes þearfum on Godes naman], þæt we doð  
 and so what so we do God.GEN service.DAT in God.GEN name.DAT that we do  
 Gode sylfum.  
 God.DAT self.DAT  
 'and whatever we do as service to God, in God's name, we do to God himself.'  
 (coaelhom,+AHom\_26.3:8.3925)

In fact, though, (20) has the same universal reading despite being in the past tense, and again *swa hwar* could be translated as *wherever*. This suggests that although the correlation between simple present tense and generic sentences is far from perfect, the exceptions strengthen the more interesting claim that left-peripheral free *hw*-relatives are interpretively specialized, as generic sentences and quasi-universal free relatives tend to be found in other tenses in this construction as well.

- (20) Soðlice [swa hwar swa Israhela bearn wæron], þar wæs leoht.  
 Truly so where so Israel's children were, there was light  
 'all the children of Israel had light in their dwellings.'  
 (cootest,Exod:10.23.2788)

Meanwhile in (21), despite the simple present tense, the free relative is clearly intended to refer to a single individual (as multiple individuals cannot all cast the first stone). However, the identity of that individual is unknown, an example of von Stechow's ignorance reading.<sup>3</sup> Once more, *swa hwylc eower* could be translated as *whoever*.

- (21) [Swa hwylc eower swa næfð nane synne on him], awyrpe se ærest ænne  
 So which you.GEN.PL so NEG.have no sin in him, cast.out.SBJ he first one  
 stan on hy  
 stone on her  
 'He that is without sin among you, let him first cast a stone at her.'  
 (coaelhom,+AHom\_14:214.2117)

We conclude that, even when left-peripheral position does not correlate with present tense and universal interpretation, a stronger correlation persists between left-peripheral position and the range of interpretations associated with *-ever*.

<sup>3</sup>In fact, as (21) is classically understood, there is no person without sin among the addressees, and the use of a definite description is intended to trigger a presupposition failure. This extra detail does not impact on the core semantic analysis of the free relative, though.

## 5.2. Results: The role of *swa*

We have shown that left-peripheral free *hw*-relatives are not representative of free *hw*-relatives as a whole. In this section, we demonstrate that left-peripheral free *hw*-relatives, unlike the clause-final variant, require *swa*. We then claim that *swa* has the same semantic function as *-ever*.

### 5.2.1. Quantitative analysis

Table 2 shows rates of occurrence of *swa*, cross-classified by position and grammatical function as before (once again, 9 tokens were excluded where the classification was unclear).<sup>4</sup> We see that *swa* is almost always present in left-peripheral free *hw*-relatives, regardless of grammatical function. Indeed, a logistic regression analysis reveals that there is no significant interaction between position and grammatical function in conditioning the occurrence of *swa* ( $p = 0.15$ ), and no main effect of grammatical function ( $p = 0.74$  once the interaction is excluded). There is, however, a highly significant main effect of position ( $p = 3.9 \times 10^{-13}$  once grammatical function is excluded).

|                 | Argument        | Adverbial     |
|-----------------|-----------------|---------------|
| Left-peripheral | 97.9% (231/236) | 93.9% (46/49) |
| Clause-final    | 67.1% (110/164) | 68.9% (31/45) |

Table 2: Distribution of *swa* in free *hw*-relatives

As well as the facts that *swa* ... *swa* is almost categorically present in left-peripheral free *hw*-relatives, and that such free relatives occur disproportionately often in present tense, the tenses of the main verbs in the free relative and matrix are identical more often than is expected. In 88.5% (255/288) of left-peripheral cases, either both verbs are present or both verbs are past. The same is true of only 65.3% (139/213) of examples with clause-final free *hw*-relatives, a highly significant difference ( $p = 6.1 \times 10^{-10}$ , Fisher's exact test). The cumulative effect is that correlative structures with left-peripheral free *hw*-relatives are unusually fixed: *swa* is omnipresent, and the tenses of the main verbs in the free relative and matrix are normally identical. We cannot find out why free *hw*-relatives in these constructions have the interpretations they do, because these features cannot be adequately teased apart.<sup>5</sup> Clause-final tokens are more promising, as these factors can be better distinguished. Examples with and without *swa* can be found in reasonable quantities for both argumental and adverbial free *hw*-relatives. This gives us more information about how the attested range of interpretations arises.

<sup>4</sup>The two *swas* almost always occur together, but there are 11 examples in which only one or the other *swa* occurs. For present purposes, it makes no difference which *swa* we count; we chose to count the second.

<sup>5</sup>It is not clear how a structure as complex as these correlatives can be so fixed. This poses significant analytical challenges in its own right. Luckily, the point of the above discussion is simply that we have to look elsewhere to understand the compositional interpretation of free *hw*-relatives.

## 5.2.2. Qualitative analysis

Clause-final free *hw*-relatives with *swa* also show *-ever*-like readings. In generic sentences like (22), their interpretation is quasi-universal.

- (22) Fyres gecynd is þæt hit fornymð [swa hwæt swa him gehende bið].  
 Fire.GEN nature is that it consumes so what so it.DAT near is  
 ‘Fire’s nature is that it consumes whatever is near it.’  
 (cocathom1,+ACHom\_I,\_22:360.152.4446)

In episodic sentences, different subcases of von Fintel’s presupposition can be seen. Prior context suggests an ignorance reading for (23): Joseph has been placed in charge of Egypt, which is suffering from famine. The people come to the Pharaoh for advice, and the Pharaoh utters (23) with no apparent knowledge of what Joseph will tell them to do.

- (23) Gaþ to Iosepe & doþ [swa hwæt swa he eow secge].  
 Go to Joseph and do so what so he you.DAT say.SBJ  
 ‘Go unto Joseph; what he saith to you, do.’ (cootest,Gen:41.55.1711)

Meanwhile, (24) may well be a case of indifference, with the subjunctive mood on *wolden* reinforcing the fact that the speaker is not talking about a definite time.

- (24) he him aþas swor & gislas salde, þæt he him gearo wære [swa hwelce dæge  
 he them oaths swore and pledges gave that he them ready be.SBJ so which day  
 swa hie hit habban wolden]  
 so they it have want.PST.SBJ  
 ‘he swore oaths and pledged to them that he would be ready whenever they wanted it.’  
 (cochronA-1,ChronA\_[Plummer]:874.5.844)

Finally, (25) is an interpretive parallel of (21). It is part of the story of Zacchaeus, a tax collector who repents upon meeting Jesus. Other Bible translations typically do not entail that Zacchaeus admits to taking anything, suggesting that the interpretation of *swa hwæt swa ic reafode* is once again not definite.<sup>6</sup>

- (25) and þærtocæcan ic wylle be feowerfealdum forgyldan [swa hwæt swa ic reafode]  
 and moreover I will by fourfold repay so what so I stole  
 ‘and if I have taken any thing from any man by false accusation, I restore him fourfold.’  
 (coaelhom,+AHom\_17:175.2450)

<sup>6</sup>Jacobson’s denotation for free relatives still carries an existential presupposition, whereas modern Bible translations like the PDE version below typically do not in this case. In principle, this could indicate that the denotation of *swa hwæt swa* is slightly different from *whatever*. Equally, though, it could just be sloppy translation.

Without *swa*, the interpretations are for the most part straightforwardly definite, as in (26).

- (26) Gemyne, [hwæt Sanctus Paulus cwæð]  
 Remember what Saint Paul said  
 ‘Remember what Saint Paul said.’ (cogregdC,GDPref\_and\_3\_[C]:15.207.28.2739)

The picture with present-tense examples is less straightforward, in ways which go beyond the scope of this short paper. (27) is indicative of the kinds of challenges which arise.

- (27) & ða dioflu gearwe bidað, [hwonne heo mec gegrypen & to helle locum gelæde].  
 and the devil ready waits when it me grasp.SBJ and to hell.GEN fold lead.SBJ  
 ‘and the devil lies ready for when it may grasp me and lead me to hell’s fold.’  
 (cobede,Bede\_5:14.440.13.4432)

It appears that the denotation of the free relative is a definite time, but one whose identity is not yet known. It may be that von Fintel’s presupposition for *-ever* accounts for this case, and indeed, (27) may equally well be translated by *when* or *whenever*. Whether it would be equally acceptable in OE to replace *hwonne* with *swa hwonne swa* is, of course, unknown.

Regardless of the correct analysis of these examples, we conclude that free *hw*-relatives without *swa* have the same definite interpretation as PDE definite free *wh*-relatives. Free *hw*-relatives with *swa* are interpreted like PDE *wh-ever*-relatives. Accordingly, *swa* is interpreted like *-ever*.

### 5.3. Discussion

The key finding from this empirical investigation is that OE free *hw*-relatives can be analysed as definite descriptions, using Jacobson (1995), Dayal (1997), and von Fintel (2000) as models. Concerning our broader question, the emergence of headed *wh*-relatives from free *hw*-relatives, this is much more promising than a conceivable alternative, implied by the traditional literature, where free *hw*-relatives are interpreted universally. Although the compositional details of that analysis are rarely spelled out, it seems likely that such an analysis would eventually posit an interpretation of *hw*-forms as universal quantifiers. This is synchronically problematic, in that *hw*-forms never have such interpretations in other syntactic contexts, but also diachronically problematic, as it would require a pairing of a gradual syntactic change with a catastrophic semantic change, the loss of *hw*-forms as universals.

As shown in the above, it is easy to misconstrue free *hw*-relatives as universals when considered as an undifferentiated whole, as the clearly non-universal cases are in a minority relative to the large numbers of examples of the syntactically and semantically quite fixed correlative relatives like (21). However, with a view to explaining the emergence of headed *wh*-relatives, this may turn out to be a blessing in disguise. The clause-final free relatives are a likely diachronic source for

headed relatives precisely because of their final position: as we have seen, headed *wh*-relatives initially emerged in clause-final position, with adverbial *wh*-phrases. This is a very close fit for the patterns of interpretation of free *hw*-relatives: they are most likely to be interpreted non-universally in clause-final position, and more likely still with adverbial grammatical function. In other words, the evidence for a Jacobsonian interpretation of free *hw*-relatives is strongest precisely in cases which are independently likely to provide the diachronic source of headed *wh*-relatives. We will not attempt to explain why the left-peripheral free *hw*-relatives are so fixed — we would love to know, but it is tangential to our main goal of identifying semantic properties of the structures which grew diachronically into headed *wh*-relatives.

We turn now to the nature of the semantic change implied by our new understanding of free *hw*-relatives. By adopting the Jacobsonian analysis of OE free *hw*-relatives, we avoid the kind of catastrophic semantic change which would be associated with loss of lexically encoded universal entailments introduced by *wh*-forms, but there is still undoubtedly some semantic change associated with the emergence of headed *wh*-relatives. Indeed, a first look might suggest that this semantic change is still catastrophic in some respects. It therefore behoves us to develop an appropriate notion of ‘catastrophic semantic change’.

We have argued that free *hw*-relatives are definite descriptions. That is, they denote individuals (more precisely, functions from situations to individuals, but we can afford to abstract away from that here). On the other hand, early headed relatives can be analysed, along the lines of Potts (2005), as denoting backgrounded propositions.<sup>7</sup> The emergence of headed relatives therefore involves a shift in the type of the relative, from *e* to *t*. This could be construed as catastrophic.

We think that the key to understanding how this could happen is to concentrate on the operator at the top of the relative (we do not take a stand on whether this operator is lexically associated with *wh*-forms, or a null element dissociable from them, such as  $\delta$  in Caponigro 2003), and the integration of the object formed by that operator into the surrounding clausal material. Our context of reanalysis consists of a clause-final relative which could be parsed as a free relative in apposition or as a headed relative. (28) is an example.

- (28) þæt se ungesewena wulf infær ne gemete, [hwanon he in to Godes eowde cume  
 that the unseen wolf entrance NE find whence he in to God’s herd come.SBJ  
 & þær ænig scep of abrede]  
 and there any sheep off snatch  
 ‘that the unseen wolf may not find an entrance from where he might come into God’s herd  
 and snatch any sheep.’ (cochdrul,ChrodR\_1:11.1.232)

<sup>7</sup>This analysis is normally associated only with nonrestrictive headed relatives, and indeed, most early headed relatives are nonrestrictive. However, exceptional early cases of headed *wh*-relatives can be found which depart from the canonical nonrestrictive cluster of properties. These exceptions still cluster semantically, though, with several examples of headed *wh*-relatives modifying negative indefinites, for example. We believe that these examples remain compatible with the propositional analysis sketched in the main text, but the details must wait for another time.

The core propositional content is contained before the relative, while the relative itself functions as an elaboration of the argument *infær*. Such an elaboration could equally well arise from an individual denotation (with an implicit identification of the individuals picked out by the free relative and by *infær*), or by an open proposition, where the individual variable contributed by *hwanon* is anaphorically related to *infær*.

A simplified PDE example may allow us to make things more explicit. The relative in (29) shows the same ambiguity between appositive free relative with individual denotation (29-a) and headed relative with propositional denotation (29-b).

- (29) I arrived in London, where I stayed the night.
- a. ... you know, (the place) where I stayed the night.  
 $arrive(I, London) + \iota x.(stay(I, night, x))$
  - b. ... by the way, I stayed the night there  
 $arrive(I, London) \bullet (stay(I, night, x))$

In both (29-a) and (29-b), the denotation of the relative is built compositionally from the same property  $\lambda x.stay(I, night, x)$ . Between (29-a) and (29-b), though, two things change. The operator in the free relative (29-a) converts that property into a definite description  $\iota x.stay(I, night, x)$ , which is then integrated with the preceding proposition by the mysterious operator  $+$  (we will say nothing about  $+$ , but take the existence of examples like (29-a) as strong evidence that such an operator must exist). Meanwhile, the operator in the headed relative (29-b) supplies a free variable as an argument of that property, converting it into a proposition  $stay(I, night, x)$ . This proposition is then combined with the preceding proposition by the equally mysterious, but possibly distinct, operator  $\bullet$ .

None of these type-theoretic shenanigans affect the global interpretation, because the distinction between the free relative operator  $\lambda P \iota x.P(x)$  and the headed relative operator  $\lambda P.P(x)$  is cancelled out by the mechanisms subsumed under  $+$  and  $\bullet$ , respectively: a referential dependence is formed between *London* and  $\iota x.(stay(I, night, x))$  in the case of the free relative, and between *London* and  $x$  in the case of the headed relative. The same information gets associated with the same referents in the two cases, by quite different compositional routes.

This is precisely what an instance of semantic reanalysis should look like. The relative in (28), just like the relative in (29), can be of type *e* or type *t*. This is a substantial difference within a structured theory of semantics, and all the more so because (28) occurred at a time when *hw*-relatives were not typically associated with denotations of type *t*. However, the superficial interpretive consequences (if there are any) of this quite substantial formal shift are minimal. Such an ambiguity of representation allows new semantic structures to enter the language without catastrophic interpretive consequences, as is familiar from classic discussions of reanalysis in syntax and phonology.

## 6. Conclusions

This paper has examined the emergence of headed *wh*-relatives from free *hw*-relatives, insisting that a successful analysis must not involve catastrophic semantic change, any more than catastrophic syntactic change. Our analysis has been almost entirely synchronic, focusing on a stage when the emergence of distinctively headed *wh*-relatives had barely begun and demonstrating that the semantic properties of free *hw*-relatives at that stage are largely similar to the semantic properties of early headed *wh*-relatives. This similarity is clearest among clause-final relatives, where definite interpretations of free relatives are quite common. This is important because clause-final relatives provide the ambiguous context which feeds reanalysis, in this case reanalysis of free relatives in apposition as possibly extraposed headed relatives.

This reanalysis is syntactically quite unremarkable: a surface string is compatible with two structural analyses, one conservative, one innovative. Diachronic evidence shows the diffusion of the innovative analysis through the system along various dimensions, over the following several centuries. The more novel contribution of this paper is to show that this syntactic reanalysis must be paired with a parallel semantic reanalysis: free relatives, being basically nominal, denote individuals; headed relatives, being clausal, denote propositions, and the emergence of headed relatives is only possible because an individual-denoting constituent can be reanalysed as propositional. Although such a shift would be hair-raising in some cases, the discourse status of these clause-final relatives means that it has little effect on the interpretation of these relatives in the wider context. Just as with phonological and syntactic instances of reanalysis, large shifts in structured semantic representations are possible, so long as those shifts entail only minor interpretive consequences.

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