The CP Cycle of \textit{wh}-elements\textsuperscript{1}

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In this paper, I explore grammaticalization and renewal in the left periphery of the clause, i.e. in the hierarchically highest CP-layer. Elements that have a function in the lower part of the clause as well as the higher part are very likely to be reanalyzed as functioning only in the higher part. \textit{Whether} starts out as a pronoun and after frequent fronting is reanalyzed as an element in the left-most layer of the sentence as a complementizer and \textit{yes/no} marker. In the 18th century, its \textit{yes-no} marking function is lost and, currently, its use as complementizer is decreasing. There is a renewal in that the adverb \textit{how} is being used as a \textit{yes/no} marker and complementizer. I refer to this series of events as the CP Cycle. The paper contributes to the discussion about features so important in Minimalism since the mid 1990s. I argue that the grammaticalization of \textit{whether} and \textit{how} involves a loss of semantic/interpretable features but an increase in uninterpretable ones.

Keywords: complementizer, grammaticalization, interrogative, renewal, \textit{wh}-words

1. \textbf{Introduction}

Sentences contain information about argument structure in their vPs, about temporal relations in their TPs, and about information structure in their CPs. The CP also marks the anchoring of one clause to another clause, if there is one, usually through a complementizer (a C). The C can be dependent on the verb in the clause above it, as well as on the verb in the clause below it, and marks characteristics of both. If it is the highest C, it marks the mood, e.g. interrogative or declarative.

This paper examines the sources of two C elements, \textit{whether} and \textit{how}. These processes involve grammaticalization and renewal, namely a CP cycle, which I formulate in terms of feature economy.

\textsuperscript{1} Some of the examples and analysis in section 2.1 are taken from van Gelderen (2009).
The outline is as follows. In section two, I examine the history of whether which I put in theory-neutral terms. Whether changes from pronoun to interrogative marker and complementizer. I then show that it is lost as yes-no marker by the eighteenth century and how it currently seems to be on the decrease as a complementizer. Section three examines a possible renewal of whether, namely how. Again, the section is descriptive. In section four, I provide some theoretical background on how a sentence is formed according to the Minimalist Program, the theoretical framework assumed in this paper. Section five explains the changes in whether and how using this theoretical framework.

2 The history of whether

In 2.1, I provide data on the history of English whether. I first describe the various functions and then the positions it has in the CP. In 2.2, I examine how it may have arisen and how it is being lost.

2.1 From D to C

The OED's etymology of whether shows it as originating from an Indo European form of 'who' with a comparative suffix. This original pronominal function can still be seen in (1a-c) from Old English, where whether may be fronted in a question or not. In (1a), the entire phrase *hwæðer* para *twegra* dyde *þæs fæder willan* is fronted to the specifier of the CP layer, in (1b) nothing is, and in (1c) only *hwæðer* is.

\begin{enumerate}
\item \textit{hwæðer} \quad \textit{para} \quad \textit{twegra} \quad \textit{dyde} \quad \textit{þæs} \quad \textit{fæder} \quad \textit{willan}
\end{enumerate}

\begin{itemize}
\item From D to C
\end{itemize}

\begin{enumerate}
\item a. *Hwæðer* \quad *para* \quad *twegra* \quad *dyde* \quad *þæs* \quad *fæder* \quad *willan*
\end{enumerate}

'Who of the two did the father's will?'

\begin{itemize}
\item (West Saxon Gospel Corpus, Matthew 21.31, Skeat’s edition)
\end{itemize}

\begin{enumerate}
\item b. \textit{ond} \quad \textit{siþðan} \quad \textit{witig} \quad \textit{god} \quad \textit{on} \quad \textit{swa} \quad \textit{hwæþere} \quad \textit{hond}
\end{enumerate}

and then wise lord to so whichever hand

\begin{itemize}
\item ... \textit{mærðo} \quad \textit{deme} \quad \textit{swa} \quad \textit{him} \quad \textit{gemet} \quad \textit{pince}.
\end{itemize}

... glory grant so him right think

'And may the wise lord grant glory to whichever side he thinks right.'

\begin{itemize}
\item (Beowulf 686, Klaeber’s edition)
\end{itemize}

\begin{enumerate}
\item c. \textit{hwæðer} \quad \textit{sel} \quad \textit{mæge} \quad \textit{aefter} \quad \textit{wælraese} \quad \textit{wunde}
\end{enumerate}
From a preposed pronominal stage in Indo-European, *whether* is reanalyzed in a higher position. In the earliest Old English, it is already an (interrogative) complementizer in (2ab) and an overt question marker in (3ab).

(2) a. *þær se snotera bad. hwæðer him alwalda æfre wille ... wyrpe gefremman*  
there the wise waited whether him almighty ever would ... change accomplish  
`There the wise one waited whether the almighty would ever grant him change.'  
b. *ða cwædon ... hwæðer ænig man him mete brohte*  
then said [the disciples]... whether any person him food brought  
`Then said [the disciples] has anyone brought him food.'  

(3) a. *Hwæðer wæs iohannes fulluht þe of heofonum þe of mannum*  
Whether was John's baptism that of heavens or of man  
`Was the baptism of John done by heaven or by man.'  
b. *Hwæðer ic mote lybban oðdæt ic hine geseo*  
Whether I might live until I see him  
`Might I live until I see him?’  

In the literature, a distinction is made between Selected Embedded Questions, as in (4), and Unselected Embedded Question, as in (5) (see e.g. Adger & Quer 2001). Both

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2 The status of *hwæðer* in this sentence is unclear. As can be seen in Zupitza's (1959) facsimile (though not in Klaeber's (1922) now standard edition), the scribe indicates by means of a period, a punctus, that the clauses are separate, so *hwæðer* could be introducing an independent clause with an initial adverb.
of these appear in Old English and I assume they are selected by the verb and negative in similar ways.

(4)  
\[ \text{þær se snotera bad } \text{hwæþer } \text{him alwalda} \]
\[ \text{there the wise waited whether him almighty } \]
\[ \text{æfre wille } \ldots \text{ wyrpe gefremman.} \]
\[ \text{ever would } \ldots \text{ change accomplish} \]

'There the wise one waited whether the almighty would ever grant him change' (Beowulf 1313-5).

(5)  
\[ \text{Ne } \text{wæs me on mode cuð, } \text{hwæðer } \text{on Þyssum folce } \]
\[ \text{not was me on soul known whether on these people } \]
\[ \text{frian ælmihtiges egesa wre, } \text{Pa ic her ærest com.} \]

'Very was not known to me in my soul whether there was fear of the almighty in these people when I first came here'. (from Parra-Guinaldo 2013: 92, Genesis 80)

Turning now to the positions of the various \textit{whether} forms, Allen (1980: 791) argues that the finite verb immediately follows when pronominal \textit{whether} is fronted, as in (1a). Parra Guinaldo (2013: 113), in a study of \textit{whether} in the Old English portion of the Helsinki Corpus, confirms this. This word order pattern is expected in a verb-second language because of the phrasal status of the \textit{whether} phrase.

When \textit{whether} is used as a complementizer, as in (2), (4), and (5), it is a head in C. The position is hard to test since V-second does not typically occur in embedded clauses and extraction data may be absent for other reasons. There is a complementizer \textit{þe} (or infrequently \textit{ðe}) that follows \textit{whether} occasionally, but in the 47 cases from the Dictionary of Old English Corpus, none follow an embedded \textit{whether}. The cases are all instances of pronouns, as in (6), or coordinating conjunctions. This complementarity in the distribution of \textit{whether} and another complementizer makes a head position for \textit{whether} likely.

(6)  
\[ \text{Ac geher nu geðyldelice hwæt ic nu sprecan wille,} \]
But listen now patiently what I now say will
δeah hit þe gefyrn ær unnyt þuhte, hwæðer þe se ende a bet lician wille.
though it thee before unneeded seemed whether thee the end better please will
(Alfred, Boethius, 35, 101, 16)
‘But listen patiently to what I am now going to say; though once it seemed to thee
unprofitable, perhaps the end will please thee better.’
(http://www.uky.edu/~kiernan/ENG720/SdgTrans/SedgefieldProseTrans.htm)

When *whether* is an independent question marker, as in (3), its position can be
checked. If it is followed by a verb, as in (3a) and (7), it is a specifier; if followed by the
subject, as in (3b) and (8), it is most likely a head.

(7)  *Hwæðer* wille ge δaet ic cume to eow, ðe mid gierde ðe mid monnðwære gæste?
Whether will you that I come to you or with rod or with gentle spirit
'Do you want that I come to you, with a rod or with gentleness of spirit?'
(Alfred, Pastoral Care, Sweet’s edition 117.7-8).

(8)  *Hwæðer*  þu  giet  ongite  þaet  ða  uncweðendan  gesceafte
Q          you    yet    see    that    the           speechless creatures
wilnodon  to  bionne  on  ecnesse  swa  ilce  swa  men,  gif  hi  meahten?
wish        to  proclaim  to  eternity  as  each  as  men  if  they  could
'Do you perceive yet that the speechless creatures wished to proclaim to eternity
just as each man if they could? (Parra Guinaldo 2013: 87, Alfred, Boethius 92)

According to Allen (1980: 791), the use of initial, interrogative *whether* typically does
not result in inversion of the verb and subject, i.e., in verb-second. Ukaji (1997: 1240)
agrees with this. All Beowulf examples show this and it may indicate that interrogative
*whether* is in the head C position in Old English most of the time. There are a few
instances such as (3a) and (7), however, that show *whether* is a specifier. In these,
*whether* may still be moving because there is a connection to the lower part of the clause.

The evidence in (7) and (8) shows that, in Old English, *whether* is either in a
specifier or a head position of the CP, but more often in the latter. If *whether* is
occasionally a specifier, one might expect a *pat* or *pe* head in complementizer position, and this is the case in (9) and (10).

(9)  

**Hwæþer pe pin eage manful ys forpam pe ic god eom?**  
whether that your eye evil is because that I good am  
`Are you envious because I am generous?' (from DOE, West Saxon Gospel Matthew 20.15)

(10)  

**Hwæðer be ðæt dust herige, on ðære burgene; oþþe hwæðer**  
whether that the dust praise on the graves or whether  
*hit cyðe ðine rihtwisnesse?*  
it testify your righteousness  
'Do they praise the dust from the graves or does it announce your righteousness?'  

This doesn't occur frequently in Old English. Out of 1451 variations on *hwæþer(e)* in the *Dictionary of Old English Corpus*, there are only a handful examples of (9) and (10), thus providing further evidence for head status of *whether* in Old English (see also Parra Guinaldo 2013: 83-84). Klaeber, in his glossary to *Beowulf*, distinguishes a pronominal *hwæðer* from a complementizer *hwæþer* (from an adverbial *hwæþ(e)re*). Note the slight differences in spelling, but I do not think they shed light on the complexity and phrasal status of these elements.

The cases of verb-second continue with the pronominal use until Middle English, see e.g. (11) where the *hweðeres* is part of a phrase, but not when *whether* is a question marker, as in (12).

(11)  

**hweðeres  fere  wult  tu  beon?**  
Who-GEN companion will thou be  
`Whose companion do you want to be?' (*Ancrene Riwle* 284.14, Morton edition).

(12)  

**Hweðer eni  totilde ancre  uonede  euer  ðis**  
Whether any peering nun found ever this
‘Did any peering nun ever experience this?’ (*Ancrene Riwle* 44.18, from Allen 1980: 790; Morton 102.2-3).

In colloquial registers, such as the 15th century *Paston Letters*, there are no *whether* interrogatives. After Middle English, some instances of initial *whether* remain but their status (specifier or head) is unclear as the different word orders in (13a) and (13b) show.

(13) a. **Whither** Charles Arundell dyd not steale ouer into Irland withein thes fiue yeres, wytheought leaue of her Magestie and **whether** that yeare he was not reconciled or not to the churche lekwise, or how long after.


b. **Whether** hadst thou rather be a Faulconbridge, And like thy brother to enjoy thy land: Or the reputed sonne of Cordelion, Lord of thy presence, and no land beside.

   ’Had you rather be a Faulconbridge?’ (1595, Shakespeare, *John I*, i, 134-6).

There are only two instances of *whether* similar to (13b) in the First Folio edition of Shakespeare’s plays; these are given in (14) and these also have *whether* in the specifier position. The reason for this is that, in (13b) and (14), *whether* can still be seen as meaning ‘which of the two’.

(14) a. Whether doest thou professe thy selfe, a knaue or a foole?

   (Shakespeare, *All’ Well* 4.5.24)

b. Whether had you rather lead mine eyes or eye your master’s heels?

   (Shakespeare, *Merry Wives* 3.2.4)
There are quite a number of cases in the First Folio where *whether* means ‘where/whither’ and the complementizer uses show a frequent fronting of the clause introduced by *whether*, as in (15).

(15) And whether we shall meete againe, I know not.

(Shakespeare, *Julius Caesar*, 5.1)

Section 2.1 has provided the basic information on the Old English uses of *whether* and the likely position (specifier or head of CP). Interrogative *whether* seems no longer in use in the 16th century, except in the pronominal use. We’ll see a few examples from the 18th century in the next section; complementizer *whether* remains used till the present, as we’ll also see there.

2.2 *The rise and fall of whether*

In this section, I look at which of the two grammaticalized uses of *whether* is the first to arise and which is the first to be lost.

As to whether the complementizer (embedded clause) or question marker (main clause) use is first, this question is hard to answer since both already occur in Old English. Parra-Guinaldo (2013) examines the use of the Gothic equivalent. This language shows only pronominal use and an ambiguous *yes/no* marker in (16).

(16) *hvaþar ist raihtis azetizo qidan:*

Which of the two is indeed easier say

afletanda  bus  frauwurhteis  pau  qidan: urreis  jah  gagg?

'Which of the two is indeed easier to say: 'your sins are forgiven' or to say 'arise and walk'?'

'Is it indeed easier to say 'your sins are forgiven' than to say 'arise and walk'?'

(Matthew 9:5, Codex Argenteus, Parra Guinaldo 2013: 157)
The ambiguity in (16) may indicate that the use of hvaþar `whether’ in the main clause is earlier in Germanic than its use in an embedded clause. As we’ll see in section four, it actually makes more sense from the point of view of features that the main clause use is earlier.

In Old Norse, the use of hvárt `whether’ is as in Old English. It is used as a main clause interrogative, as in (17), and as a complementizer, as in (18).

(17)  **hvárt** grætr þú nú Skarphedíinn?
Q  cry  you  now  S
‘Are you crying, Skarphedin’? (Faarlund 2004: 226, Njal’s Saga 303.27)

(18)  *Njáll* spurði Gunnar **hvárt** hann myndi til þings riða
Njal  asked  Gunnar  whether  he  would  to  assembly  ride
‘Njal asked Gunnar whether he was going to ride to the assembly’
(Faarlund 2004: 256, Njal’s Saga 71.26)

So, Old Norse gives no further clues to the grammaticalization path. In Modern Scandinavian, there is no trace of hvárt.

Turning now to which of the two uses is lost earlier in English, the answer is clearly the main clause one. After Old English, the use of whether as a complementizer continues, as in (19) from Early Modern English, (20) from the eighteenth, and (21) from the nineteenth century.

(19)  Good sir, say **whether** you’ll answer me or no. (Shakespeare, Errors 4.1.60)

(20)  It is very obvious, ..., to know **whether** it be possible for us to understand what is meant by the absolute existence of sensible objects *in themselves*, or *without the mind*. (1710 Berkeley *Principles of Human Knowledge* I, 24)

(21)  I only doubt **whether** he will ever take us anywhere else. (1816, Austen, *Emma* chap 1)

From the sixteenth century on, main clause whether is disappearing and is gone completely by the eighteenth century; verb movement to C is used instead, as in (22).
Among the last examples of main clause *whether* in the *OED* is (23); other late instances are provided in (24) and (25).

(22) Will not it be a good plan? (1816, Emma, chap 14)

(23) *Whether* does Doubting consist in embracing the Affirmative or Negative Side of a Question? (OED, 1713 Berkeley, *Three Dialogues Hylas & Philonous* i.5)

(24) "*Whether* corporeal substance can think," "*whether* Matter be infinitely divisible," and "how it operates on spirit"- these and like inquiries have given infinite amusement to philosophers in all ages; but depending on the existence of Matter, they have no longer any place on our principles. (1710 Berkeley, *Principles of Human Knowledge* §85)


Comparing (23), (24), and (25), we see the same split between specifier use in (23) and (25) when *whether* can be seen as somehow related to the lower clause and head use in (24) where *whether* is a clear *yes/no* marker. The disappearance of the latter is expected because other alternatives are available (Verb-movement to C) to express questions. However, the disappearance of the use as specifier, such as in (23), and (14) above, is unexpected because it involves *wh*-movement, a very frequent process.

Although *whether* is still used in present-day English, its use is seen as formal. The reason may be because it kept its position as specifier through the disjunctive emphasis (and use of `or not’) and also because of its bisyllabic shape.

(22) I don’t know whether he’ll be able to achieve that.

Evidence that this use is (slowly) declining comes from the *Corpus of Historical American English*. Where in 1820 there were 332.17 instances of complementizer use per million words, there were only 201.98 in 2000.
3 Renewal

In this section, I will examine changes involving the adverb how. These changes mirror those that whether underwent from wh-element moving to the CP to an element generated in that position. To most speakers of English, the uses of how as complementizer and as question marker seem quite recent and many do not accept sentences that include them. However, the OED has a section that provides Old English examples of complementizer use. I will first discuss the use of how as adverb and as complementizer (section 3.1) and then as yes/no interrogative (section 3.2).

3.1 How from A to C

The adverb how typically moves from a VP-internal position, as in (27), to the specifier of CP, as in (28). As such, it can also be used in the CP of an embedded CP, as in (29).

(27) He did that HOW?
(28) How did he do that how?
(29) I wonder how he did that how?

Willis (2007) provides some data, e.g. in (30), on the how that is now being used as a complementizer head and no longer as a wh-element in a specifier position. The intended meaning is below it.

(30) Dwyer told the players how he wanted to win

' D. told the players that he wanted to win.' (from the BNC as given by Willis 2007: 434)

I thinks this how still has the sense of degree and may modify wanted – more on this use below.

Some other examples of how as a C are given in (31) to (34), from British and American sources. The first sentence (still) is ambiguous between a manner adverb and a complementizer. Sentences (32) and (33) have the subject emphasizing the truth of the
embedded clause. The degree meaning of *how* is reanalyzed as a positive polar, i.e. declarative mood. Sentence (34) is a polar complementizer.

(31) We saw *how*, in Chapter 2, a biological system of animals functions like any other mechanistic system. (BNC C9A 1337)

(32) Susan assured me everything would be okay. Connie said *how* nobody could blame me. (COCA 2012 Fiction)

(33) Your Dad once said how I had legs like Betty Grable (BNC AC5 2999)

(34) The men will wonder *how* there'll ever be enough lobsters around this island for seven more men to ... (COCA 2000 Fiction)

This means that the manner adverbial *how*, after frequent *wh* movement, is now - at least in certain varieties of English - base generated as a C in the CP. It has a very specific ‘flavor’ though due to its origins as a manner adverb.

As mentioned, many speakers of English are reluctant to accept (31) to (34). The *OED*, however, provides examples of “weakened meaning, introducing an indirect statement, after verbs of saying, perceiving, and the like” in (35) to (38). Some of these are ambiguous, e.g. Old English (35), but not Middle English (36) to (38). Note again that there is a positive polarity in these Middle English examples.

(35) *We gehirdon ... hu ge of slogon ... Seon and Og.*
we heard how you slew ... S and O
(OED, c1000, Ælfric Joshua ii. 10)

(36) *Hym thoughte how þt the wynged god Mercurye Biforn hym stood.*
‘It seemed to him that the winged god Mercury stood before him’
(OED, c1385 Chaucer *Knight's Tale* 527)

(37) A letter was brought ... certefyng him *how* he was elected to be a Cardinal.
(OED, 1548, Hall's Vnion: Henry VIII f. lvii)

(38) *He..saide to the kyng, How his fadir hette Felip.*
‘He said to the king that his father was called Felip.’ (OED, K. Alis. 1565)
Modern English examples of complementizer *how* are given in (39) and (40). The first is quite clear in that *how* can be replaced by *that*; the second is more exclamatory, more like a *why*.

(39) Now I would fain **know how** any thing can be present to us, which is neither perceivable by sense nor reflexion, nor capable of producing any idea in our minds, nor is at all extended, nor hath any form, nor exists in any place. (1710 Berkeley *Principles of Human Knowledge* 68)

(40) By this sense, or faculty of seeing, they are enabled to bring events which are yet future, as well as those otherwise out of sight, present to their minds; and thus they can behold them with their mental eye, as clearly as we behold objects at a distance. " This, you may say, is visionary indeed. And you may wonder **how** I can doubt of the truth of miracles, if I can believe in such a chimerical idea as this! " (COHA, Ballou, Hosea 1820, A Series of Letters in Defence of Divine Revelation)

As for the position of the *how* complementizer, it is in the specifier position, as the addition of *that* in (36) and (41) and the ungrammaticality of *wh*-extraction in (42) show.

(41) pending where we could save money, and bob corker is a very condescending tone, said **how that** that was not a Serious proposal.  
(http://krugman.blogs.nytimes.com/2012)

(42) *What did he tell the players how he wanted to win what.*

Concluding this subsection, the *OED* cites examples from Old English up to the present and so it seems that the complementizer function has always been available for *how* in English but that it remains ambiguous. There is a particular positive polarity associated with the use.

### 3.2 How as interrogative
Turning to the interrogative use, this change is very much in progress. For many speakers, (43) is still a *wh*-question modifying the verb *go*, and, for some, it may modify the higher verb *like* to express the degree of liking. However, for a number of other speakers, it can be a *yes/no* question. Current corpora show evidence of this use, as in (44) and (45). Note that most of these have a modal in the main clause and can be seen as modifying the degree of willingness.

(43) How would you like to go to the park?
(44) How would you like having a liberal black man from Kenya as president someday? (COCA 2012 Fiction)
(45) Paul said, "Starting would be a good thing to do. How would you like to begin?“ (COCA 2010 Fiction)

These bring about auxiliary-movement to C so the *how* is in specifier position.

I’ll now show the various stages by which the lower manner adverb *how* is reanalyzed, first as an epistemic adverb and then as *yes/no* marker. As a manner adverb to a lexical verb, *how* has occurred from Old English, as in (46), to the present, as in (47).

(46) Hu sculon wit nu libban oððe on þys lande wesan ...  
how should we now live or on this land dwell  
‘How shall we live or dwell on this land now?  (OED, Genesis 805)
(47) How will you fix the sink?

*How* is often used emphatically, which the *OED* calls the `pregnant use` (*OED s.v. how*). There are late Middle English examples that show this, such as (48) to (50), and later ones to the present, as in (51) to (56).

(48) And hue is hit uoul dede zeppe hit is kendelich?  
‘how is it a foul deed since it is natural?’  
(OED, 1340 *Ayenbite*, Morris 47)
(49) Hou shulde sich sense be error in man?
(OED, c1380, Wycliffite Serm. Sel. Wks. I. 60)

(50) **Howe** durst any be so bald to blemysche..Þe hand-werke of þat hiȝe gode?
(OED, a1400–50, Alexander 4345)

(51) If thou be to ly at the Altar, **how** wantst thou a Priest to say thy soule Masse?
(OED, 1606 Birnie Blame of Kirk-buriall xi. sig. C4v)

(52) **How** saidst thou, She is my sister?
(OED, 1611, Bible, Gen. xxvi. 9)

(53) **How** could you think of tying yourself to such a family?
(OED, 1715 Defoe Family Instructor 1841, II. i. i. 16)

(54) "**How** you talk, Huck Finn. Why, you'd HAVE to come when he rubbed it, whether you wanted to or not." (1885, Twain, Huckleberry Finn, chap 3)

(55) **How could** you suppose me ignorant? (1816, Austen, Emma, chap 6)

(56) "When a man has great studies and is writing a great work, he must of course give up seeing much of the world. **How can** he go about making acquaintances?"
(Eliot, Middlemarch, chap 4)

Many of these emphatic ones modify a modal, and express a sense of epistemic wonder. I therefore label these adverbs as epistemic. **How** is sometimes used as a generic question word, as in (57), and frequently in exclamations, as in (58) and (59), all through the history of English.

(57) **How** say you to a fat Tripe finely broyl'd? (Shakespeare, *Shrew*, 4.3.20)

(58) **Hu** þu biswikest monine mon!
‘How you betray many a man.’ (*Brut*, Caligula 1704)

(59) the Heauens themselues Doe strike at my Iniustice. **How** now there?
(Shakespeare, Winter’s Tale 3.2.148)

It is hard to find purely *yes/no* marking interrogative use. Around 1830 in the *Corpus of Historical American English*, sentences such as (60) and (61) appear but they are not really different from the older uses in that the modal seems necessary.
"Well," said the stranger, "you must find time to go away. You're too noisy. **How would** you like to go before the mayor?" "No, I'd rather not. Stop -- now I think of it, I've asked him before; but perhaps if you'd speak a good word, he'd give me the first vacancy." (COHA, 1838 Charcoal Sketches, Joseph Neal)

“... **How would** you like to go with us?” “Lord, Massa, you joking. Go wid you? ...” (COHA,1836 The Partisan Leader, Nathaniel Tucker)

Frequent colloquial examples start occurring later, as in (62), but again with a modal.

(62)  "How you talk, Ben Rogers. **How** can they get loose when there's a guard over them, ready to shoot them down if they move a peg?"

(1885, Twain, *Huckleberry Finn*, chap 15)

Having provided a basic description how *how* is used as *wh*-element next to a complementizer use from Old English on. It was also used to modify the degree and manner of higher modals in an epistemic use. I will now provide some background to the framework and in particular to features before using that framework to account for the changes.

**4. Minimalism and features**

In this section, I sketch the basic derivation of a sentence in a Minimalist framework (Chomsky 1995). This will be relevant in understanding the changes.

The derivation starts by selecting lexical and functional items from the lexicon and by merging the verb with a complement, as in (63). (I will leave out some details, such as Case marking of the object by the verb).

(63)  \[
\text{VP} \\
\text{V} \quad \text{D} \\
\text{see} \quad \text{what}
\]
The next step is to add the light verb (if applicable) and another argument (if there is one). This is shown in (64).

(64) \[
\begin{array}{c}
D \\
\leftarrow \text{v'} \\
\text{She} \\
\leftarrow v \\
\leftarrow \text{VP} \\
\leftarrow \text{V} \\
\leftarrow \text{D} \\
\leftarrow \text{see} \\
\leftarrow \text{what}
\end{array}
\]

The words in (64) are combinations of features taken from the lexicon. Thus, *she* has third person singular interpretable features and *what* has third person interrogative features.

Let me add a note about the use of interpretable and uninterpretable features, as described in Chomsky (1995). Interpretable features are relevant for interpretation at Logical Form and include categorial and nominal person and number features. They are not deleted or erased after they are checked because they are relevant to the interpretative component. Uninterpretable features receive a value when they search, i.e. probe, and find an interpretable feature on a goal in their c-command domain. These valued features are not interpreted at Logical Form; they just go to the Phonological Form and, in English, involve the case features of NPs and verbs and the person and number features of verbs.

Since 1995, Chomsky has not modified his view on interpretable/uninterpretable features much, although Chomsky (2012) seems to restrict the features that function as probes to Q and phi-features, although the version published as Chomsky (2013) doesn’t mention this. Other proposals have been put forward, for instance, by Pesetsky & Torrego (2001; 2006) who argue that valuation and interpretation should be kept separate. For Chomsky, uninterpretable features need to be valued but Pesetsky & Torrego argue that allowing unvalued interpretable and valued uninterpretable features leads to a simplification. I will come back to both views in section five.
Returning to (64), the next step will be to add the temporal layer, here just represented by \( T(\text{ense}) \). \( T \) has interpretable tense features but uninterpretable person and number features (inherited from \( C \)). It searches (or probes) for a nominal it c-commands to agree with. It finds this nominal, or goal, in \textit{she} and each element values its uninterpretable features which then delete (\textit{she} has uninterpretable case features that are valued by \( T \)). The result is shown in (65) where the features that are not `struck through' are interpretable and not subject to elimination. The subject moves to the position next to \( T' \) in languages such as English (the EPP effect).

\[
\begin{array}{c}
\text{(65)} \\
\quad \text{TP} \\
\quad \quad \text{she} \quad \underline{\text{T'}} \\
\quad \quad \underline{\text{u-Case}} \\
\quad \quad \quad \text{will} \\
\quad \quad \quad \text{\( u-3S \) she} \\
\quad \quad \quad \text{v'} \\
\quad \quad \quad \quad \quad \quad \quad \text{v} \\
\quad \quad \quad \quad \quad \quad \quad \quad \text{VP} \\
\quad \quad \quad \quad \quad \quad \quad \quad \quad \text{D} \\
\quad \quad \quad \quad \quad \quad \quad \quad \quad \text{see} \\
\quad \quad \quad \quad \quad \quad \quad \quad \quad \text{\( i-3 \)} \\
\quad \quad \quad \quad \quad \quad \quad \quad \quad \text{\( i-wh \)} \\
\quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \text{\( \text{\textit{what}} \)} \\
\end{array}
\]

(I am leaving out a discussion of phases and how \( \text{what} \) would have to adjoin to \( \text{vP} \); see e.g. van Gelderen 2013 for more).

The last layer to be added is the \( \text{CP} \). Because the sentence is interrogative, the \( \text{C} \) will have an uninterpretable Q-feature, as in (66), and the \( \text{wh} \)-word will move to the \( \text{CP} \). For Pesetsky & Torrego, the features of \( \text{C} \) would be interpretable but unvalued with the advantage that the clause would be typed at the semantic level as a \( \text{wh} \)-question.
In (66), the auxiliary *will* also moves to C, resulting in (67).

(67) What will she see?

Pesetsky & Torrego (2001; 2006) adapt an idea from Rizzi (1996), namely the *wh*-criterion, to account for T-to-C movement of *will* in (67). Rizzi argues that an interrogative C needs to be licensed by a *wh*-specifier and a *wh*-head that are in a Spec-Head relationship. In the case of objects, T moves to C to license the head and the *wh*-element moves to the specifier of the CP. In the case of subjects, only the *wh*-element needs to move since this subject was already in a Spec-Head relationship with T. Pesetsky & Torrego reformulate that by assuming that C has a [u-T] feature (with EPP) that needs to be checked. T to C movement of *will* is needed when an object *wh*-element appears, as in (66), since the object *wh*-element doesn’t check [u-T]. With a nominative *wh*-element, as in (68), the nominative can check the [T] as well as the [wh]-feature, and hence an auxiliary is not needed.
Who left?

In a yes/no question, C will have uninterpretable Q-features that can be valued by the auxiliary. Again, Pesetsky & Torrego would argue that this feature is unvalued but interpretable. We’ll come back to this.

If the CP is an embedded CP, as in (69), the C needs an uninterpretable feature to function as C to its clause (u-Q or u-T) but it will also need a feature that values something the higher verb selects. Lohnstein (2005) and Roussou (2010) have written about this dual role of the complementizer. Roussou (2010: 582) puts the function of the complementizer as having the “dual capacity of being selected by a matrix predicate and of selecting a clause”. In a Chomsky (1995) system, shown in (69), the valued interrogative features on C would serve that function.

(69) I wonder [what C [she will see]].

[u-Q] [i-wh] [u-Q:wh]

In the model advocated by Pesetsky & Torrego, the C would be interpretable but unvalued.

The actual features of (69) are adapted from Bayer & Brandner (2008) and Bayer (2012) who show that the features can be split over more than one lexical item in certain languages. They analyze interrogative embeddings, as in Dutch (70), as having wh-, polarity, and complementizer features spread over different words.

(70) Ik vraag me af wie of dat hij zag. Dutch

[i-wh] [i-pol] C

I ask me PRT who if that he saw

‘I wonder who he has seen’

I won’t consider languages such as Dutch here.

In English sentences with an interrogative complementizer, such as (71), the Q-features of that complementizer will be valued by whether in the specifier position. The
verb *wonder* (or the negative predicate in (5) above) probe for an interrogative complement and find this either in the valued features of *what* in (69) or in the features of C valued by *whether* in (71).

(71) They wonder \[whether C [she’ll go]].

\[u-Q] \[i-pol] \[u-Q-pol\]

In this section, I have discussed the features on the interrogative C. In a strict Chomsky (1995) sense, the Q-features on C are uninterpretable and need to be valued by having something base generated in the specifier or move there. Declarative clauses would have [u-phi] on C and adverbial clauses temporal or causal features. I will restrict myself to interrogative main and subordinate clauses.

5. Changing features

In this section, I first show what happens structurally in the changes involving *whether* and *how*, i.e. the CP Cycle. Then, I discuss the features that may be involved in this cycle and end on a cautionary note.

The start of a typical CP Cycle involves an element that has two functions, namely to contribute to the argument and event structure in the VP and also to contribute to the mood of the sentence, in this case the interrogative mood. The second stage may be where that element is reanalyzed as specifier of the CP and then as head. I have shown these stages in (72) (see also van Gelderen 2009, 2011).

(72) a. CP

```
wh  C'     ... ⇒
C     ...  
V P
DP/AP
```

b. CP

```
wh  C'     ...  
C     ...  

(below)⇒
```
The changes described in this article follow this path although some more than others. Main clause interrogative *whether* is reanalyzed from pronoun to specifier to head and then disappears as head. However, its complementizer function as the specifier of CP remains stable and isn’t reanalyzed as head of the CP. In the case of *how*, the interrogative function appears late and both interrogative and complementizer remain in the specifier position.

In (72), once the element is in the head, a renewal may take place, depending on how crucial the function is – more on this later. One explanation for these changes is that Economy Principles such as Late Merge and Head Preference (see van Gelderen 2004) ‘bias’ learners and speakers towards analyzing elements as higher and as heads. The Head Preference Principle says that the language learner/user prefers heads over full phrases (i.e. specifiers) and the Late Merge Principle claims that learners analyze an element as base generated in a high position rather than as base generated low with multiple movements to higher positions. In recent years, it has been claimed that multiple movements are no less economical than single merge and more emphasis has been placed on features. I therefore will also examine these changes not in terms of structural principles but in terms of features.

Assuming that question features are checked in CP, this is done via movement of *whether* to the specifier of CP but later by an interrogative *whether* that is base generated there or in the head C. The features representing the changes are given in (73) and (74). (73) shows interrogative *whether* as going through all the stages before disappearing but complementizer *whether* is still in the specifier position; (74) shows that neither interrogative nor complementizer *how* have reached the head stage.
(73)  *whether*, pronoun in VP  >  *whether*, Specifier CP >  C  
    semantic polarity/phi  [i-pol]  [u-Q]  
    [i-wh]  
    Examples (1), (10), (14)  (2), (9)  (19), (20)

(74)  *how*, adverb in VP  >  *how*, Specifier CP  
    semantic manner and degree  [i-pol]  
    [i-wh]  
    Examples  (46), (47)  (30), (45)

(73) and (74) show the major pathways. The degree features of *how* have been reanalyzed as positive polarity ones, both in the complementizer and (main clause) interrogative uses.

I will now look at some details, in particular (a) why *whether* was lost as an interrogative, roughly at the beginning of the early Modern English period, (b) if the model of (73) and (74) predicts that one of the two innovations will arise or be lost first, (c) what some of the intermediate stages are, (d) whether Pesetsky & Torrego’s views on features account for the changes better, and most importantly (e) why the features change the way they do.

As for (a), the strategy of using *whether* competed with that of moving the verb which was a very common way of making *yes/no* questions from early on, as (75) shows.

(75)  *gehyrest*  *þu*  *eadwacer*  
    hear  you  Eadwacer  
    'Do you hear, Eadwacer?' (from *Wulf and Eadwacer*)

In Old and Middle English, as in other Verb-second languages, either the lexical verb or the auxiliary moves to the C in main clauses. This changes and, by 1600, very few lexical verbs move to second position and auxiliary verbs end up moving to C only in questions. It is tempting to connect the loss of interrogative *whether* with this more specialized use.
of auxiliary to C movement: the features of C are checked by a verb rather than by a lexical verb or \textit{whether}. This relation is just approximate, however.

Question (b) is which of the two innovations, the embedded or main clause one, will arise or be lost first. The answer is that we don’t know. There is possible evidence from Gothic that main clause use of the \textit{whether}-form was first but it is the opposite with \textit{how}. The feature composition of (73) and (74) doesn’t favor one over the other either.

As for (c), there are many nuances in the use of \textit{whether} and \textit{how}. One of the ones I indicated above involves \textit{how}.

(76) Manner-\textit{how} lower VP > epistemic adverb > yes/no
manner and degree [i-degree]  [i-pol]
[i-wh]

The formulation in (76) (and (73) and (74)) brings us to point (d). Pesetsky & Torrego’s model would differ in that the features of \textit{how} would be valued but uninterpretable. I don’t see an immediate advantage for accounting for the changes except perhaps in the last stage from specifier to head. Let’s look at the stage where \textit{how} is a specifier. In (77), \textit{how} would value the features for C but C would be relevant for the interpretation at the semantic interface.

(77) \begin{enumerate}
\item \textbf{CP}
\item \textbf{how}
\item \textbf{uQ[pol]}
\item \textbf{C’}
\item \textbf{TP}
\item \textbf{iQ[ ]}
\item \textbf{...}
\end{enumerate}

The next stage, to head, would be one where \textit{how} is reanalyzed as iQ[pol] and would seem to be simpler. This begs the question why the reanalysis to head hasn’t happened!

Chomsky (2013) argues that specifiers are a problem because it puts a maximal projection XP next to another maximal projection YP. In principle, therefore, structures
such as (77) are to be avoided, where how is XP and the C’ is YP, because the labeling mechanism wouldn’t know how to label the resulting CP. He makes an exception for (77) because the interrogative feature is shared (p. 45). This may explain why the specifier is stable in interrogatives.

The last question involves the reason why features change the way they do. Van Gelderen (2011) suggests Feature Economy. As children add lexical items to their lexicons, they do this in terms of bundling features. Once they have connected a word to a set of features, they can also use this word with fewer features. Reanalysis or reuse of already available vocabulary happens frequently in child language, as in (78), where is is analyzed as an invariant question marker, somewhat like whether was.

(78) a. Is I can do that?
    b. Is Ben did go? (from Akmajian & Heny 1975: 17)

Working with features, one of the challenges is to know what the inventory if and if all need to be expressed. Chomsky (1965: 142) says that “semantic features ..., are presumably drawn from a universal ‘alphabet’” but that “little is known about this today”. The situation is not a lot better almost 50 years later. Typological work has worried about the inventory and necessity of certain features as well, e.g. Bybee (1985) and Bisang (2013).

In this section, I have formulated the CP Cycle in terms of structural and featural changes and pointed out some areas that remain unclear.

6. Conclusion

Whether starts out as a pronoun and after frequent fronting is reanalyzed as an element in the left-most layer of the sentence. Between the fifteenth and the eighteenth centuries, its yes-no marking function is completely lost and, currently, its use as complementizer is decreasing. The adverb how has similar functions as complementizer and interrogative marker, but shows differences in the stages of change.
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