Cyclical Change and Problems of Projection

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Specifiers are reanalyzed as heads and heads as higher heads. When the older specifiers and heads are renewed, a linguistic cycle emerges. Explanations that have been given for these cycles include structural and featural economy (e.g. van Gelderen 2004). Chomsky's (2013; 2015) focus on labeling as unconnected to merge makes it possible to see the cycles in another way, namely as resolutions to labeling problems. The Labeling Algorithm (LA) operates after merge is complete, at the point that a syntactic derivation is transferred to the interfaces. When a head and a phrase merge, the LA automatically determines the head to be the label. In cases where two phrases merge, the LA cannot find the head and one of the phrases either has to move or share features with the other. I will argue that, in addition to Chomsky's resolutions to labeling paradoxes, reanalyzing a phrase as a head also resolves the paradox. This change is very frequent as I show in eight cross-linguistically attested changes which are part of full cycles. In addition, in the renewal stage of a cycle, adjuncts are frequently incorporated as arguments and this shows a preference of set-merge (feature-sharing) over pair-merge.

Keywords: head, labeling, linguistic cycle, minimal search, phrase, feature-sharing, PoP, renewal

Introduction

A linguistic cycle describes a regular pattern of language, a round of linguistic changes taking place in a systematic manner and direction. For instance, an independent pronoun may come to be dependent on a verb and be reanalyzed as agreement and the independent pronoun may be renewed through a noun or demonstrative. These changes involve phrases (e.g. independent pronouns) reanalyzing as heads (e.g. agreement) and adjuncts as renewed specifiers. Heads are also reanalyzed as higher heads, but these will not be discussed in this paper.

Because the older phrases and heads are renewed, these changes are seen as cyclical, as argued in, for instance, van Gelderen (2008; 2011). The formal explanation for these cyclical changes is that,

[1] Some of the explanations in this paper overlap with those in van Gelderen (2015b) which was accepted and published online but which hasn't officially appeared yet. The current paper includes much more data and a more updated version of the PoP framework.

during acquisition, principles of economy predispose the learner to use simpler structures and features (van Gelderen 2004). The urge of speakers to be innovative may introduce new, loosely adjoined elements into the structure. In this paper, I show that it is possible to see these changes as solutions to labeling problems.

Chomsky (2013; 2015) advocates a system of free merge where labeling (of TP, DP, etc) is done via a labeling algorithm (LA) for labeling needed at the interface levels. This framework is known as the Problems of Projection (hence PoP) approach. When a head and a phrase merge, the LA automatically determines the head to be the label. However, in cases where two phrases merge, the LA cannot find the head and this results in a labeling problem. One of the phrases either has to move or share features with the other. In this paper, I argue that the problematic merge of two phrases can be resolved in another way and this process is evident in language change, namely as a change from phrase to head. The change away from adverbials involves a reanalysis of pair-merge as set-merge.

The reanalyses of phrases as heads are varied: (a) subject and object pronouns to agreement, i.e. DPs to T and v heads, respectively, (b) demonstratives to C, D, and T heads, (c) *wh*-elements to C heads, (d) Adverb Phrases to ASP heads. Other changes could be added, e.g. PP to C heads and negative adverbs to Neg heads but I have chosen to focus on changes that are very frequent (those in (a) and (b)) and those that are less frequent ((c) and (d)). The changes from adverbial to specifier involve topics to subjects. I argue all these changes provide insight into some of the labeling mechanisms, e.g. is simple search is done over sharing features and sharing features (set-merge) is selected over pair-merge. Each of the cases will be exemplified and discussed in terms of labeling.

The paper's first section will outline the basics of Chomsky (2013; 2015; 2016). The second section will provide a few instances of reanalysis of the subject and object DP to a T and v head, from French and Athabascan languages, respectively. The third section is on the changes affecting demonstrative pronouns. They reanalyze as articles, complementizers, and copulas. I will provide a number of scenarios on what might prompt the reanalysis. Section 4 will examine further sources for C-heads, namely *wh*-elements, and will consider Adverb Phrases as they change to ASP. Section 5 turns to the change from adjunct to specifier. Section 6 is a conclusion.

1 From projection to the labeling algorithm (LA)

Early Phrase Structure Grammar (e.g. Chomsky 1965) and X'-bar theory (e.g. Jackendoff 1977) take for granted that a phrase is headed and expands to a maximal projection with a specifier, head, and complement. This X'-schema is seen by many as perhaps one of the greatest insights into syntactic

structure. The spirit of the current Minimalist Program (Chomsky 1995 through the present), however, is to attribute as little as possible to the computation, restricting it to simple merge with a labeling algorithm needed for the conceptual-intentional interface.

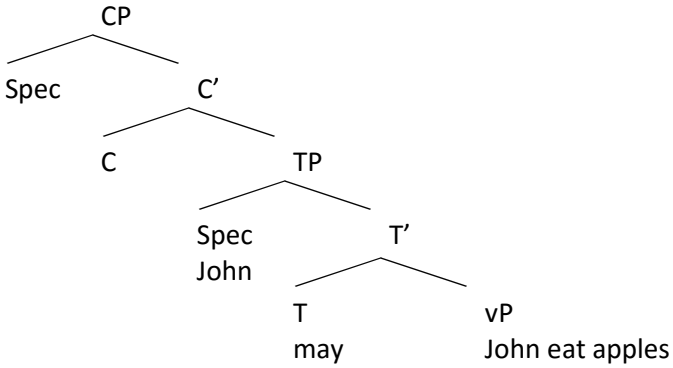
In early Generative Grammar (e.g. Chomsky 1965: 85), language-specific phrase structure rules, such as (1), are responsible for generating sentence structure. (1a) generates the basic sentence and (1b) the Verb Phrase. Chomsky (1970) and, especially, Jackendoff (1977: 17) reformulate these rules as a category-independent and language-independent schema, as given in (2).

(1) a. S → NP VP
b. VP → V NP

(2) a. XP → YP X'
b. X' → X ZP

In the mid-1980s, the X'-schema of (2) is extended to grammatical categories, such as T, C, and D, and the result is the familiar structure in (3), again with the head determining the label of the higher phrase.

(3)



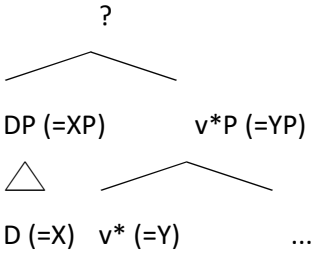
Taking the Minimalist Program seriously means attributing less and less to Universal Grammar, in particular to rules such as (2), and restricting the generative part of a derivation to a computational operation called Merge. External Merge (EM) takes two objects and yields an unordered set {X, Y} without a label (Chomsky 2013: 42); Internal Merge (IM) takes an already formed syntactic object and takes part of that and merges it with the original syntactic object. Labeling the set is not part of Merge and should therefore be avoided and left to a requirement of the interface. The labeling algorithm (LA), stated in (4a), involves just a minimal search and "must take place at the phase level, as part of the Transfer operation" (Chomsky 2015: 6). It is like Agree, not Match, and part of Minimal Computation, i.e. a third factor effect. Rizzi (2014: 12) formulates it slightly differently, as in (4b).

(4) a. The **Labeling Algorithm** is "a special case of minimal search" seeking "heads H within its search domain" (Chomsky 2015: 6).

b. **Labeling Algorithm**: The category created by Merge receives the label of the closest head. Labelling must be complete at the interfaces. (Rizzi 2014: 12)

There are three potential sets in need of labels, namely {X, YP}, {XP, YP}, and {X, Y}. The first case is unproblematic - Chomsky says "trivial" - because the LA selects the head X. The other two are "interesting" because there is no unambiguous label. Subjects in English exemplify {XP, YP} and the resolution to their labelling, IM, forces movement without having to rely on EPP features, a desired consequence. Thus, in (5), a label cannot be found because both X and Y are as accessible to minimal search and therefore appropriate as labels.

(5)



Chomsky (2013: 43) provides two solutions to labeling problems such as these: "There are, then, two ways in which [syntactic object] SO can be labeled: (A) modify SO so that there is only one visible head, or (B) X and Y are identical in a relevant respect, providing the same label, which can be taken as the label of the SO. These are the two cases that are prominently found".

Solution (A) applies in (5): the DP must move after which the v*P can be labelled. Other examples where the {XP, YP} set can be modified through movement of one of the maximal projections is the movement of a phrase out of a copula clause. Movement of one of the maximal projections, as in (6), would result in a structure that can be labeled. According to Chomsky (2013: 44), "[t]he intuitive idea is that the lower XP copy [in (6)] is invisible to LA, since it is part of a discontinuous element, so therefore β will receive the label of YP".

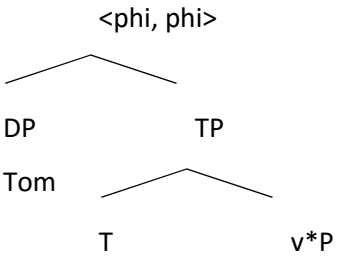
(6) XP copula {β XP, YP} (Chomsky (2013: 44)

Although β receives a label in (6), as does v*P in (5), both result in other cases of {XP, YP}. Assuming the next merge will be a T in (5) and that the copula is in T in (6), the result is the well-known issue that subjects in English face: they are drawn to Spec TP. Instead of positing EPP-features, labelling requirements in (5) and (6) force DP-movement. The result, given in (7), is an unlabeled α because the subject internally merges to the TP resulting in {XP, YP}.

(7) α[Tom T [Tom v* read a book]] (adapted from Chomsky 2015: 10)

In this case, solution (B) applies since the heads of the DP and TP share phi-features, and the set is successfully labeled <phi, phi> as shown in (8).

(8)



This second solution to the labeling problem can be exemplified by means of *wh*-constructions as well. If "the most prominent feature of the {XP, YP} set "is shared", labelling is not a problem. It will be labelled using "the interrogative feature Q, a feature of C and the head of α" in (8a) (2013: 45). Sharing the Q-features between the PP and C in (9a) has the result that the PP does not move further, as the ungrammatical (9b) shows.

(9) a. They wondered [α in which Texas city [C [JFK was assassinated]]]

b. *In which city did they wonder JFK was assassinated.

The fact that the *wh*-element cannot move further from (8a) to (8b) is called the `halting problem' or `criterial freezing' in Rizzi (2006; 2014), the basic intuition being that the *wh*-element included in the PP shares contradicting features: *y/n* for the embedded C and *wh* for the main clause. Once it has shared features in the embedded CP, it is frozen.

Labelling resolutions also provide an account for the *that*-trace effect in (10a): α cannot be labelled by the phase head C if *who* has moved. When the phase-head C deletes, as in (10b), it transfers phasehood to T and *who* can remain in Spec TP until it is moved in the next phase.

(10) a. * [γ Who do you v* [ε think [δ C that [α t T read the book]]]]
b. [γ Who do you v* [ε think [δ C [α t T read the book]]]]
(Chomsky 2015: 10-11)

Apart from {XP, YP} being challenging, the set {X, Y} is problematic. Here Chomsky (2013: 47) says that this applies when one of the heads is a root and the other a functional element determining its category. If roots don't count as labels, no problem arises. Chomsky (2015: 12) mentions another case of head-movement, namely to T and v* and here "T [is] affixed to V. More generally, the conventional theory of head-raising seems to have the story backwards: the host should be affixed to the raised element" so these are not cases of {X, Y} because "the affix is invisible to the labeling algorithm". See Carstens, Hornstein, & Seely (2013) as well.

Labeling paradoxes can be resolved by having one of the XPs move, as in (5) and (6), or by ignoring one label (the root), or by feature-sharing in (8) and (9a). The first two solutions are worked out in Chomsky (2013), whereas the latter is the focus of Chomsky (2015). I now turn to some linguistic changes that may be accounted for by the requirements of the labeling algorithm and I will account for why some change does not occur because it doesn't present a problem for the labeling algorithm. Other work showing phrase to head reanalysis appears as Jäger (2005; 2010), Weiß (2007), Willis (2007), Bayer & Brandner (2008), Bácskai-Atkári & Dekány (2014).

2 Subjects to T and objects to v*

In this section, I first sketch a typical subject cycle and provide an explanation from a labeling perspective for the first part of the cycle. I then move to the object cycle and do the same.

2.1 The subject cycle

The typical stages of the subject cycle are given in (11) where English words are used for convenience.

(11) a. They (often) eat tomatoes.
b. They'eat tomatoes.

c. (Them) th'eat tomatoes.

d. Them (often) eat tomatoes.

In (11a), the pronoun is fully independent and need not be adjacent to the finite verb whereas, in (11b), it is cliticized to the verb. If the pronoun is interpreted as agreement marker, this stage will be one of null subject (or pro-drop). In (11c), the earlier independent pronoun is renewed by a new one that is ambiguous between being in topic or in subject position. If *them* is in topic position, the clitic could still count as the subject; if *them* is the subject, the clitic is now a marker on the verb. Stage (11d) is the same as (11a) with a renewed subject pronoun. Diagnostics to decide between topic and subject include that the former need to be definite where the latter can be quantifiers and indefinites. Once a quantifier appear in (11c), it is a subject. Languages can thus be seen as being in different stages of the cycle; they can have just subject pronouns, just agreement, or both.

If languages acquire agreement markers from erstwhile pronouns, one expects them to resemble these and that is indeed the case in many languages. This means the forms are available in the lexicon with different sets of features. According to Tauli (1958: 99, the Basque verbal prefixes *n-, g-, z-* are identical to the pronouns *ni* 'I', *gu* 'we', and *zu* 'you.' As early as the 19th century, Proto Indo European verbal endings *-mi, si, -ti* are considered to arise from first, second, and third person pronouns (e.g. Bopp 1816). Hale (1973: 340) argues that in Pama-Nyungan inflectional markers are derived from independent pronouns: "the source of pronominal clitics in Walbiri is in fact independent pronouns". Likewise, Mithun (1991) claims that Iroquoian agreement markers derive from Proto-Iroquoian pronouns and Haugen (2008) argues that Nahuatl agreement markers derive from earlier forms. Fuß (2005) and van Gelderen (2011) cite many additional examples.

A language where we have evidence of all the stages in (11) is French. Old French has optional pronouns that need not be adjacent to the verb, as (12) shows for the second person singular *tu* 'you'.

(12)	*Si*	*con*	***tu***	*meismes*	*le*	*preuves*	Old French
	If	when	you	self	it	prove	

`If you prove it yourself.' (http://romandelarose.org, Selden Supra 57, 40v)

Foulet (1961: 330) confirms that all personal pronouns can be separated from the verb in Old French. By the time of Modern (colloquial) French, *je* and *tu* obligatorily precede the finite verb, as the

ungrammaticality of (13) shows. See Kayne (1975: 82-5) for additional arguments. In addition, a frequent renewal in the form of *moi* (and *toi*) appears, as in (14)[2].

(13)	*Je/tu	*probablement*	*ai/as*	*lu*	*ça*	Colloquial French
	1S/2S	probably	have	read	that	
	`I've probably read that.'					

(14)	*euh*	***moi***	***je***	*trouve*	*ce*	*qui*	*en*	*souffre le plus* …Colloquial French
	Eh	me	1S	find	that	who	of.it	suffers the most
	`I think that the one that suffers the most is ...' (*Orléans Corpus*).							

If we look at which pronouns are the first ones to grammaticalize into agreement markers, they are typically the first and second person singular ones. For instance, since Lambrecht (1981), it has been argued that French weak pronouns such as *je* 'I' and *tu* 'you.SG' are agreement markers on the verb and frequently doubled, as in (14). What has also been known for a long time is that third person subject pronouns are slower to gain agreement status. To be an agreement marker, they would have to appear obligatorily and that is not the case in most varieties of French, certainly with indefinite subject, as in (15), which are rare with the weak pronoun.

(15)	*si un:*	***un Russe***	***i***	*va*	*en france ...*	Swiss Spoken French
	if a	a Russian	3S	goes	to France	
	'If a Russian goes to France.'			(Fonseca-Greber 2000: 335)		

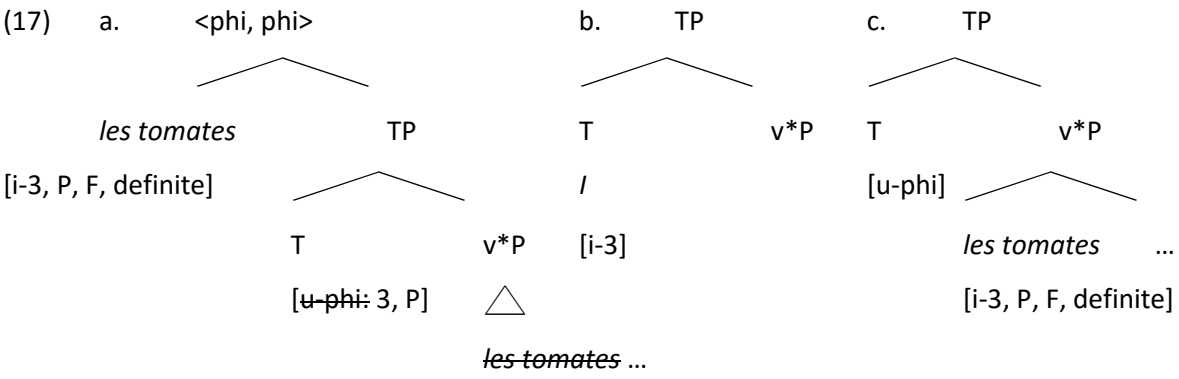
The reason the third person is 'slow' is that there are more features to be shared, e.g. gender. Gender and possibly number are in fact deleted when the pronoun becomes the agreement marker, as in (16), where *i* is marked for only third person (singular or plural) although *les tomates* are feminine plural.

(16)	***Les tomates,***	***i*** *sont*	*encore*	*vertes*	Spoken French
	the tomatos	3 are	still	green-P	

[2] In the *Corpus d'entretiens spontanés*, this doubling occurs in 8.5% with first person (239 out of 2818 *je/j'*) and, in the *Orléans Corpus*, it occurs in 13% of the first person singulars (187 out of 1424 *je/j'*). This corpus is part of the *ELICOP Corpus.*

'The tomatos, they are still green.' (Lambrecht 1981 : 40)

If we argue, with Chomsky, that DP and TP in (8) must share a phi-feature in order to be labelled, we need to know what the feature is because DPs have many. As (17a) shows, a full phrase in subject position and T share person and number and the DP cannot be confused by the language learner for an agreement morpheme. Pronouns are ambiguous and once they have lost definite and gender features, they can be reanalyzed as T, either as a T with interpretable features, as in (17b), or with uninterpretable ones in (17c). Once the phi-features are uninterpretable, a new subject is necessary, as in (17c), something that will be discussed in section 5.



Thus, a very straightforward escape from the labeling paradox in (5) and (6) would be to have a subject that has the status of a head. Chomsky (2013: 46) says that (pronoun) subjects cannot be heads because they would label the TP incorrectly, as D-headed, not T-headed. What I will argue is that the features of T in (17) are in fact agreement features and not T. This explains why pronouns change from phonologically fully independent phrases to agreement markers, as has happened in a number of languages, the most well-known case being French perhaps (see Lambrecht 1981; Roberts & Roussou 2003). A fully phrasal pronoun (that can be coordinated and modified) cannot be seen as having the same agreement features as T and can only be labelled as <phi,phi>. A head (that has to be adjacent to a verb) can be seen by the child acquiring French (or English) as similar in features to T. When the features of a pronoun overlap with those of the agreeing T, they may disappear and a structure as in (18) may be the result. This structure can of course receive a label.

(18) PhiP

Phi v*P

This account is very similar to accounts such as Roberts (2010) and van Gelderen (2011) who suggest the change from pronoun to agreement marker is due to a confusion as to whether the pronoun actually values the features of T or is itself in need of valuation. Taking Chomsky's idea of feature-sharing, the preference for subjects that are heads with minimal features similarly makes sense. Let's look how the two scenarios work in the most recent version of PoP.

In Chomsky (2016), the T merges with the v*P and the subject moves internally (to Spec TP) after which C is merged. There are of course no labels, such as C or T, just features but I have added the labels for convenience. C has uninterpretable agreement features (u-phi) which it values with the subject before transferring the features to T. Once this happens, the {DP, TP} sequence can be labelled as <phi, phi> after it arrives at the interface. In the scenario I argue for, given in Figure 1, the DP with its interpretable phi-features is reanalyzed as head and valuation and labelling occur without a need to tranfer features.

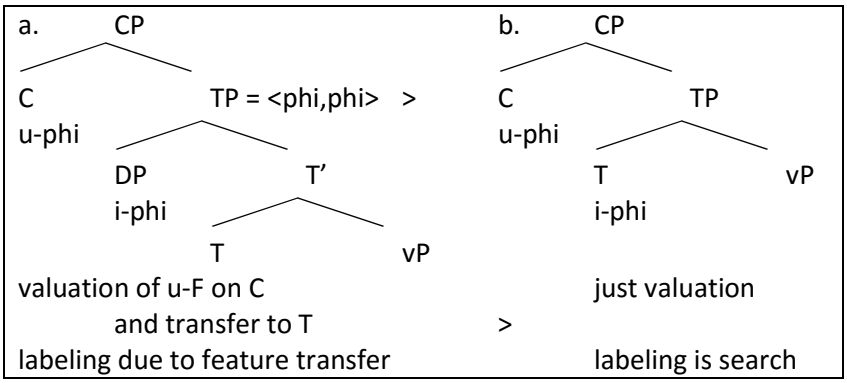


Figure 1: Reanalysis of the subject resulting in simpler labeling

After the pronoun is reanalysed as agreement, there is optional renewal in many languages, as (14) to (16) show. I come back to this in section 5.

2.2 The object cycle

I'll now turn to the object cycle, which was identified in e.g. Givón (1976). A typical object cycle is given in (19), again a fictitious case for ease of exposition. Let's say that a language has a fully independent object pronoun, as in stage (19a). Since this pronoun can be coordinated and modified and need not be close to a verb, it is a full phrase. A possible next stage is for speakers to optionally analyze this object pronoun as a head, as in (19b). This head cannot be coordinated or modified and is phonologically

dependent on the verb. The next stage might be for the object to be reanalyzed as an agreement marker. Once it has uninterpretable features, it could be renewed through an emphatic or some other form, as in (19c). The last stage, as in (19d), is similar to the first and the emphatic counting as the regular argument.

(19) a. I saw yesterday her (and him).
b. I saw 'r (*her).
c. I saw'r HER.
d. I saw her.

French does show an object cycle (see Bahtchevanova and van Gelderen 2016) but I will give some examples from other languages. In the Athabaskan family, there is a change from northern languages to southern ones in going from (19b) to (19c). A representative of a northern language is Kaska and of a southern one Navajo (see more van Gelderen 2011: 113-5). In Kaska, the incorporated pronoun is in complementary distribution with another noun, as (20) shows, whereas it isn't in Navajo (21), indicating it is agreement.

(20) a. ***me****ganehtan* Kaska
me-ga-ne-0-h-tan
3S-at-ASP-3S-CL-look
`He looks at her'.
b. ***ayudeni*** *ganehtan*
girl at-ASP-3S-CL-look
He looks at the girl(s). (Jelinek 2001)

(21) a. ***'atoo'*** ***yí****-ní-dlaa'-ísh* Navajo
soup 3S-2S-eat-Q
`Did you eat the soup?'
b. ***yí****-ní-dlaa'-ísh*
3S-2S-eat-Q,
`Did you eat it?' (Jelinek 2001: 23)

Other languages are in various intermediate stages, e.g. Persian (22) has what looks like an affix but is still incompatible with a full object and varieties of Arabic restrict (23) to certain persons while Kosrean (24) shows a doubling that makes the verbal marker into agreement.

(22) *pursed-am-ash* Persian
asked-1S-3S `I asked him'

(23) *ʃuft-ik* *ʔinti* (some) Arabic
saw.1S-2S you `I saw you.'

(24) *Nga* *kihte-l* *sah* Kosraen
I feed-3S him
`I am feeding him' (Lee 1975: 61)

How to account for this change in terms of a PoP account? Chomsky (2016) assumes a Root Phrase, which is comparable to a VP in earlier work, whose head R merges with an object, as in (a) of Figure 2. Unlike the subject in (5) and (6), an object need not move to the Spec of the RP because either R[3] can label RP or v* can transfer features to R and then the label is <phi,phi>. Reanalyzing the DP object as agreement in (b), may point to R needing to inherit the features and that is what happens in the cycle of (19abc).

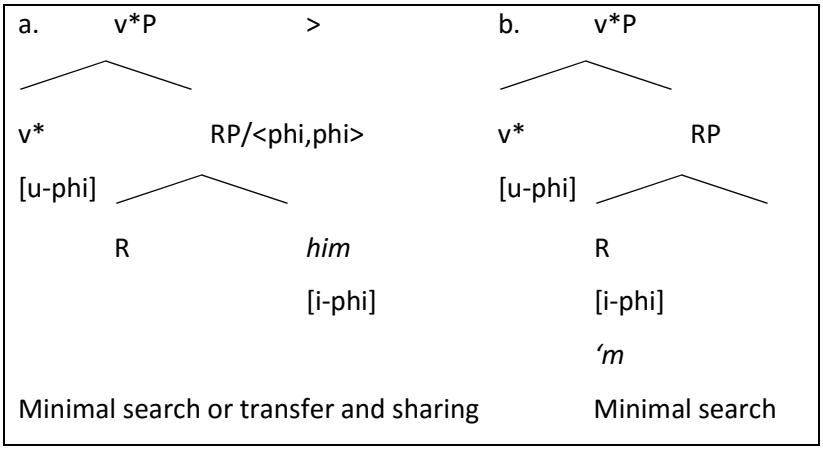


Figure 2: Reanalysis of the object resulting in simpler labeling

The renewal in stage (19d) is again not due to Economy and will be discussed in section 5.

[3] Chomsky (2016: 4) says "the question turns on whether R is analogous to `weak' T … If it is, then object-raising is obligatory."

In this section, I have discussed two cases of pronouns being reanalyzed as agreement markers. These can be seen as a preference for minimal search over feature-sharing.

3 Demonstrative pronouns

Demonstrative pronouns reduce features in a number of ways. They can lose deictic marking to become articles or complementizers and frequently reanalyze as copulas. Due to space restrictions, I won't provide a lot of examples but focus on the mechanisms.

I'll start with the reanalysis of a demonstrative to article, a change that occurred in Romance (Harris 1977, 1978) , Uto-Aztecan, Salish, Egyptian, and many more (van Gelderen 2011; 2013). In one chronicle that was written around the 11th and 12th centuries around Peterborough in England, the switch is very obvious. In (25), from 1130, demonstratives are used regularly (e.g. *se* is masculine singular nominative) and no srticles are but, in (26), from 1137 and from a different scribe, articles suddenly appear.

(25) ***Ðes*** *feorðe dæges þæræfter wæs* ***se*** *king Heanri on Roueceastre. &* ***se*** *burch forbernde ælmæst. &* ***se*** *ærcebiscop Willelm halgede Sancti Andreas mynstre &* ***ða*** *forsprecon biscop mid him. &* ***se*** *kyng Heanri ferde ouer sæ into Normandi on heruest.*

`On the fourth day after this was the King Henry in Rochester, when the town was almost consumed by fire; and the Archbishop William consecrated the monastery of St. Andrew, and the aforesaid bishops with him. And the King Henry went over sea into Normandy in harvest.'

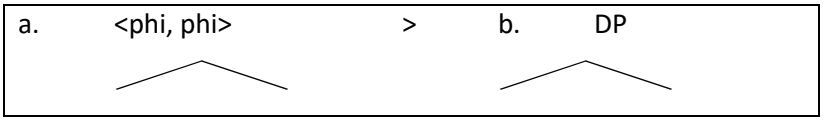
(*Peterborough Chronicle*, 1130, Thorpe edition)

(26) *ðis gære for* ***þe*** *king Stephne ofer sæ to Normandi & ther wes underfangen forþi ðæt hi uuenden ðæt he sculde ben alsuic alse* ***the*** *eom wes.*

`This year, (the) King Stephen crossed the sea to go to Normandy and was received there because they thought he was like the uncle (i.e. his uncle).'

(*Peterborough Chronicle*, 1137, Thorpe edition)

A possible reanalysis is given in Figure 3, where the label in (a) is more cumbersome to arrive at than the one in (b) and therefore prefered. The (a) stage is what we'd call concord and the (b) one is agreement.



	DP	NP	D	NP
	that/se	*book*	*the/þe*	*book*
	[i-3S]	[i-3S]	[u-phi]	[i-3S]
Labeling {DP, NP} is due to feature sharing			Minimal search	

Figure 3: Reanalysis of the demonstrative as article

Another change involving the demonstrative *þat* is to complementizer, as from (27a) to (27b). It could be represented as in Figure 4, very similar to the change to article.

(27) a. *mid al* ***þat*** ***þe*** *þeron stant*
with all DEM REL thereon stands
`with all that stands thereon.' (DOE, Will of Bishop Theodred, 15)

b. *and suggeð feole þinges …* ***þat*** *næuere nes* *iwurðen*
and say many things REL never NEG.was happened
`and say many things that never happened.'
(Layamon, Caligula 11472-3, Brook & Leslie edition)

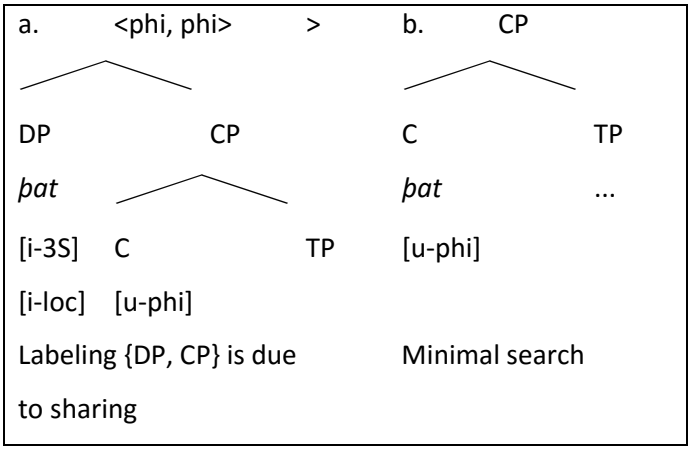


Figure 4: Reanalysis of the demonstrative as complementizer

Reanalysis of demonstratives as copulas is widely attested in Semitic, Egyptian, various creole languages, Iranian, Slavic, Tibeto-Burman, Swahili, Indonesian, Zoque, Passamaquoddy, Maya, and Chinese (van Gelderen 2015c). An example from Egyptian is given in (28) where *pw* is a masculine singular proximal demonstrative in (28a) reanalyzed as (non-agreeing) copula in (28b).

(28) a. *rmt* ***pw*** Old Egyptian
man MS.PROX
`This man' or `this is a man'.
b. *tmj-t* ***pw*** *jmn-t* Middle Egyptian
city-F be west-F
`The West is a city.' (Loprieno 1995: 68; 2001)

In (29), the derivation of a DP with its (copula-lacking) predicate is given. First, the DP and AP merge, as in (29a), which results in a labeling paradox. This is resolved after the Pred head is merged in (29b) and the DP moves internally. This, however, results in another unlabelable phrase. To resolve this, we'd have to merge T to (29c) and apply internal merge again to the DP, as in (29d).

(29) a. {DP, AP} External Merge
b. {Pred, {DP, AP}} Merge of copula
c. {DP, {Pred, {~~DP~~, AP}}} Internal Merge of DP: unlabelable result
d. {DP, {T, {~~DP~~, {Pred, {~~DP~~, AP}}}}} Merge of T and Internal Merge of DP

Anti-locality has been defined as `movement that cannot be too local' (Grohmann 2003: 26) and a reasonable domain of locality would be the phases, PredP (or v*P) and CP. Stage (29c) is therefore ruled out, just like movement of sister of V (the object) to specifier of v*P (subject) is. This is why a reanalysis as head takes place, as shown in Figure 5. Unlike the other cases, features are not involved.

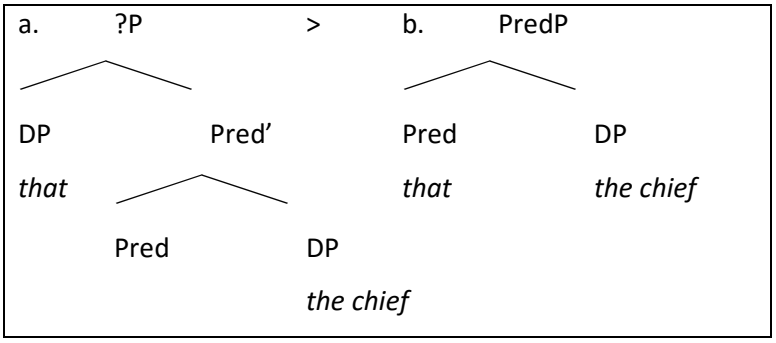


Figure 5: Reanalysis of demonstrative to copula

In short, in this section, we have seen three instances where a demonstrative is reanalyzed in such a way as to enable labeling through simple search.

4 Towards C and ASP

In 4.1, I discuss two instances where a phrase continues as the specifier of the CP and does not reanalyze as the head of C. These are interesting in that their label is feature-based but very stable, unlike the ones for subject discussed in 2.1. In 4.2, the change from adverb to aspectual affix is discussed. This occurs in many languages and will be exemplified through Modern English which shows an incipient stage.

4.1 Towards the specifier of CP

In the PoP-framework, *wh*-elements in the specifier of the CP share features with the C, as shown in (9) above, and escape the Labeling Paradox that way. The verb *wonder* in (30) requires a CP that has a Q-feature, which requirement I have marked by an uninterpretable feature on the verb in (31).

(30) I wonder whether he'll do it.

(31)

I	wonder	α[whether	[C	[he'll do it]]].
	[u-Q]	[i-Q]	[~~u-Q: Q~~]	

Whether has interpretable Q features which value the C. The label of α is then <Q, Q>. This label seems to be stable, unlike the <phi, phi> features of section 2, because *whether* is not being reanalyzed as a head. (32) shows that *whether* is a specifier because extraction is not possible and, in (33), *if* occupies the head C.

(32) *Who do I wonder whether he saw ~~who~~.

(33) the Congressmen who come in in January and asking **whether if** one kind of affects the other. (COCA Spoken 2010)

There is another complementizer that checks the Q-features, namely *how,* as in (34). Here too, *how* remains in specifier position judging from sentences with the impossibility to extract in (35) and the presence of another C head, as in (36).

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

(35) *What will the men wonder how there'll ever be enough ~~what~~.

(36) by looking on, and watching **how that** these things might be done as well as others. (COHA 1849)

Whether and *how* have been complementizers since the Old English period (van Gelderen 2009, 2015a) and have not changed to heads. The reason may be that the labeling of <Q, Q> is stable.

4.2 Towards ASP

In many languages, perfective aspect goes through a cycle in which an aspectual prefix weakens and is replaced by an adverb or adposition. For instance, Lehmann (1993: 97) and Diessel (1999: 142) argue that aspectual preverbs derive from relational adverbs and adverbial demonstratives, e.g. *hin/her* in German *hinweisen/hinfahren/herbringen*. Miller (1993: 118-124) provides instances of preposition incorporation in Ancient Greek and Latin and Booij & van Marle (2003) bring together a number of studies on many languages that show a development from adverb to preverb. These cycles occur in Indo-European, but also in the Amazonian language Nadëb, as described by Weir (1986), in Athabascan languages such as Dëne Sųłiné/Chipewyan, as described by Li (1967), and in the Uto-Aztecan Tohono O'odham.

Old English follows Germanic in having separable and inseparable prefixes on verbs to express aspectual nuances, as in (37), as well as particles, as in (38).

(37) *leofes mannes lic eall **for**swealg.*
dear man's body all up.swallowed
'He swallowed up the entire body.' (*Beowulf* 2080)

(38) *& **duste** him **dun** riht to þer eorðe*
and threw him down right to the ground
'and threw him right down to the ground'. (Elenbaas 2007: 219, St. Margarete 74.308)

Elenbaas (2007, chapter 4) argues that the particle in (38) is phrasal in nature and that that situation continues into Middle English because the particles are modified, coordinated, and preposable. There are particles that seem to combine with the verb, as in (39), from (late) Old English on.

(39) *til he aiauen **up** here castles*

`till they gave up their castles.' (*Peterborough Chronicle* 1140, 52)

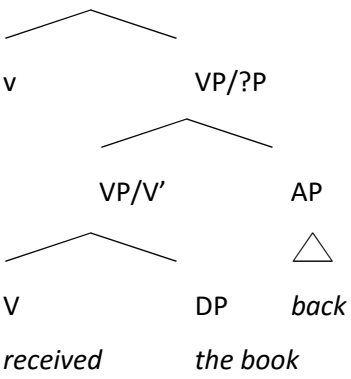
The two possibilities, (38) and (39), continue in Modern English, as in (40a) and (40b). The adverb *back* is a phrase in (40a) because it can be modified by a degree adverb, which it cannot in (40b).

(40) a. They received the book right back.

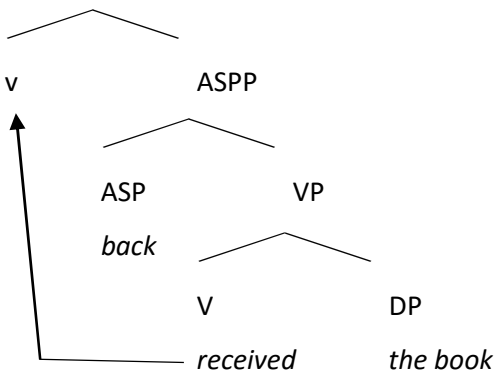
b. They received (*right) back the book

Trees for these are provided in (41ab) respectively.

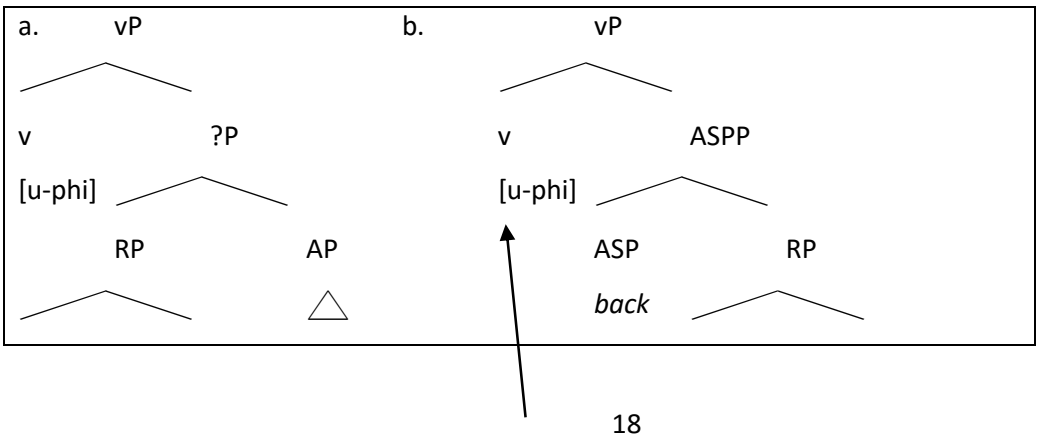
(41) a.



b.



What I have labeled the top VP/?P in (41a) is problematical for the Labeling Algorithm because it consists of two XPs. The reanalysis of the AP as an ASP head, as in (41b) therefore makes sense. The two structures are shown in Figure 6, as in Chomsky (2016), namely with R rather than V.



R	DP	*back*		R	DP
received	*the book*		———	*received*	*the book*
?P is problematic			labeling via minimal search		

Figure 6: Reanalysis of an AP as ASP head

If (39) and (40b) are more economical from a labeling point of view, why do we still have (40a)?

Concluding section 4, we have seen two cases that resist reanalysis to head and that may be due to the kind of features that are shared. We have also seen a case where reanalysis is expected and occurs but where the change is not fast in Modern English.

5 Towards argumenthood

In this section, adjuncts are shown to be frequently incorporated as arguments and this shows a preference of set-merge over pair-merge. I'll first briefly discuss pair-merge and then show some examples of the change.

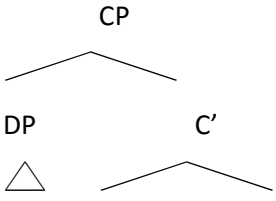
Pair-merge is invoked for adverbials because they are less integrated into a clause, evidenced by the fact that they are islands for extraction[4], as (42) shows (and argued in Huang 1982), and impervious to c-command (as shown in Lebeaux 1991).

(42) *What did he leave the house [because she sang ~~what~~].

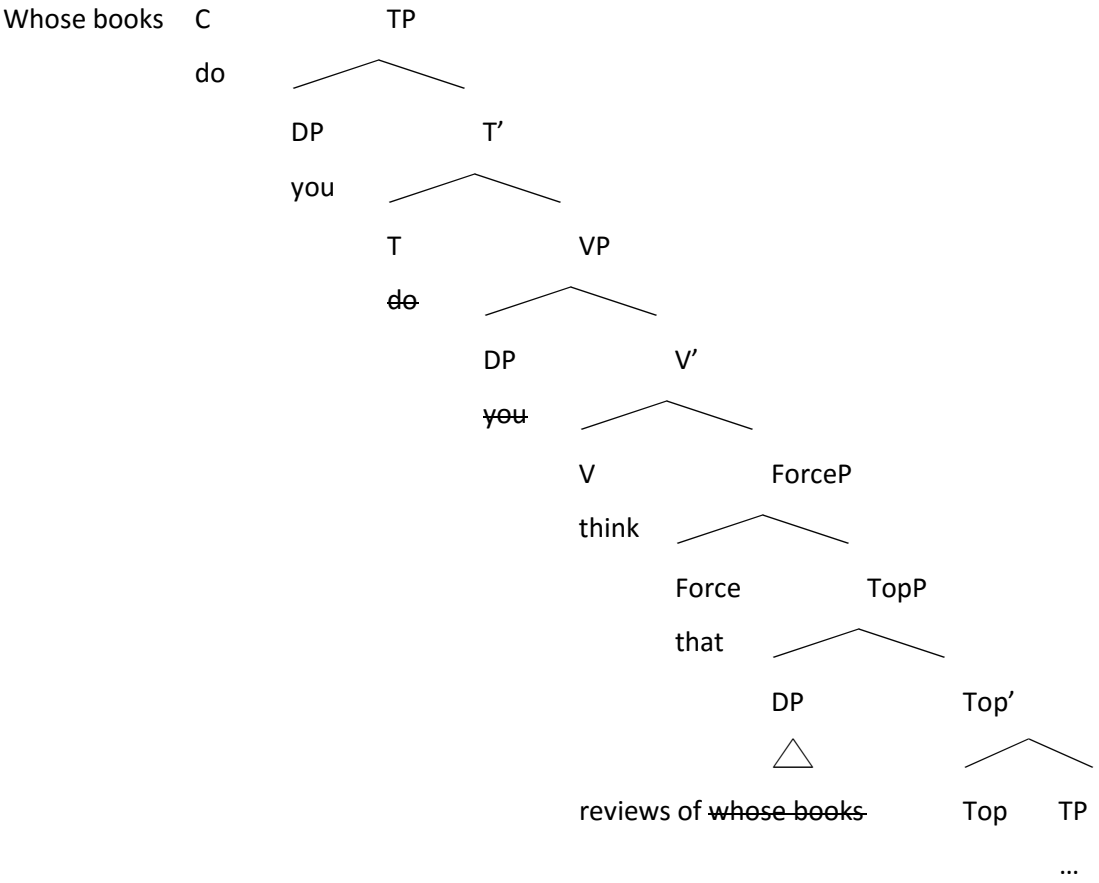
Topicalized DPs are also islands, as (43) shows, although one might not think they are in adjoined positions since the work by Rizzi (1997). Rizzi assigns topicalized elements to designated specifier positions in the left periphery, i.e. the TopP, as the tree in (44) shows.

(43) *Whose books do you think that [reviews of ~~whose books~~] John never reads ~~reviews of~~ ~~whose books~~? (adapted from Corver 2017)

(44)



[4] There are some non-finite adverbials that allow extraction (*What did John arrive whistling*), Truswell (2007) has shown (William Kruger p.c.).



So, even if topics have designated positions, like adverbials, they are not as integrated in the sentence structure as subjects and objects are.

Chomsky (2000: 133; 2001) comes up with the term pair-merge to describe adjunction. Merge comes in two kinds: ordered in pair-merge and unordered in set-merge. Chomsky (2004: 118-9) argues that adjuncts are invisible to normal operations: elements that c-command the pair-merged <a, {b,c}> continue to c-command the set-merged {b,c} but ignore the adjoined element. Although linguists have tried to do away with pair-merge, it is without debate that adjuncts are less integrated in the structure.

From a diachronic perspective, adjunct clauses have been incorporated as arguments (Hale 1976; Kiparsky 1995) and this may show a preference of set-merge over pair-merge. In what follows, I look at the change of a topic from Spec TopP to a grammatical subject in Spec TP. Van Gelderen (2008) argues that there is a principle that incorporates (innovative) topics and adverbials in the syntactic tree, as in (45a), which could be modernized in PoP terms, as in (45b).

(45) **Specifier Incorporation (SIP)**

a. When possible, be a specifier rather than an adjunct (van Gelderen 2008: 250), or

b. When possible, set-merge is preferred over pair-merge (even if feature sharing with a sister XP is involved).

Givón (1979) and others have talked about topics that are later reanalyzed as subjects, and calls this a shift from the pragmatic to the syntactic. Earlier, we saw French pronoun subjects reanalyzing as agreement affixes and a new topic/subject appearing.

(46) ***Moi,*** *j'ai* *froid.* Colloquial French
me 1S.have cold
`I am cold.'

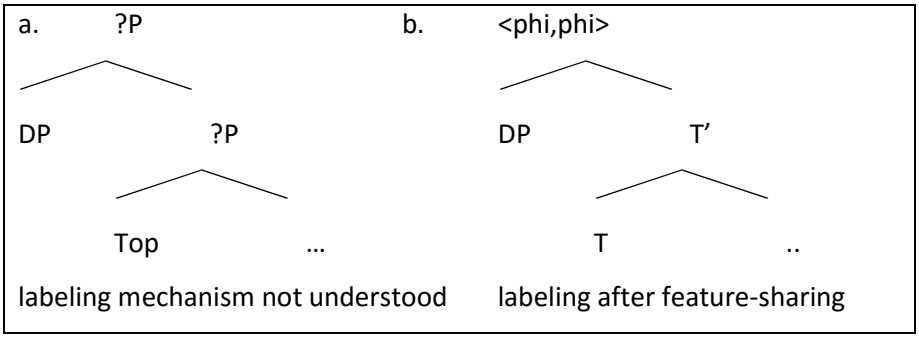
Is there evidence of a renewal of the topic *moi* in (46) as subject? The answer is yes. Various researchers have commented on colloquial forms where the DP is an indefinite or quantifier, as in (47) to (49), and these cannot be topics and are therefore seen as having been reanalyzed, as well as (14) and (16).

(47) *si un:* *un* *Russe* *i* *va* *en france* Swiss Spoken French
if a a Russian 3SM goes to France
'If a Russian goes to France.' (Fonseca-Greber 2000: 335, repeated from (15))

(48) *Chaque femme* *elle* *parle* Pied Noir French
Every woman 3SF talks
`Every woman talks.' (Roberge 1990: 97)

(49) *Un Cadien* *ça travaillait pas.* Acadian French
An Acadian 3 works not
`An Acadien doesn't work.' (Girard 2010: 2010)

The change from topic to subject is represented in Figure 7.



or pair-merge

Figure 7: From topic to subject

In this section, I have looked at the renewal of the subject through a topic and suggested a preference of set-merge over pair-merge, which is automatically selected by the language learner once the data are ambiguous, as in (46).

6 Conclusion

In this paper, I have argued that the Labeling Algorithm motivates the reanalyses involved in the linguistic cycle. PoP constitutes a paradigm-shift in attributing as little as possible to Universal Grammar and that includes labeling. Merge is forced by interface conditions that require labeling. In the change from specifier to head, we see one solution to the labeling problem: a change from feature-sharing and agree to minimal search. The cases of specifier to head change that I have selected range from frequent to less frequent. I have done this on purpose to determine other factors involves, e.g. the difference between <phi,phi> and <Q,Q> sharing.

Subject and object cycles are clear examples of the change from phrasal pronoun to agreement head. The changes involving demonstratives to articles and complementizers also involve phrase to head reanalysis that shows a preference for minimal search. In the case of reanalysis to copula, another constraint is at work, namely anti-locality. The *wh*-elements *whether* and *how* are specifiers and show no reanalysis to head which shows this feature-sharing is stable. Finally, the change from AP to ASP head is frequent in a number of languages but not in English. The changes involving the renewal of the subject pronoun show the preference of set-merge over pair-merge.

(50) summarizes the preferences.

(50) minimal search > feature sharing <phi,phi> > pair-merge

Abbreviations

ASP	aspect
CL	classifier
COCA	Corpus of Contemporary American English (http://corpus.byu.edu/coca/)
COHA	Corpus of Historical American English (http://corpus.byu.edu/coha/)
F	feminine gender

i-	interpretable feature
M	masculine gender
P	plural
PoP	Problems of Projection
Q	question-feature
S	singular
u-	uninterpretable feature
1	first person
2	second person
3	third person
#	pragmatically marked

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COHA. The Corpus of Historical American English, a 400 million corpus from between 1800-2009. http://www.americancorpus.org/

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