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## Feature Inheritance from MoodP in the Left Peripheral Field

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# Feature Inheritance from MoodP in the Left Peripheral Field

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## Abstract

The cartography analysis in syntax has dealt with wide range of syntactic phenomena. The functional categories in the left peripheral area of the cartography have their own discourse function. Based on the cartography analysis, this paper shows the possibility of occurrence of a projection called “MoodP” above FinP in the left periphery of clauses. MoodP bears the function of expressing speaker’s mood or modality concerning uncertainty, presupposition, command, advice, exclamation, remorse, disappointment, agreement, tense, negation, etc. These features concerning mood or modality in MoodP undergo feature inheritance from MoodP to T. Complementizer agreement is one of the by-products of the feature inheritance. The  $\varphi$ -features in T that are inherited from MoodP percolate up from T to Fin, which is caused by requirement of the Optimality Theoretic constraint called “Percolation” in Distributed Morphology.

Key words: *cartography, MoodP, feature inheritance,  $\varphi$ -feature, hierarchy*

## 1. Foreword

Discourse and syntax had been previously treated as individual fields, but Rizzi (1997, 2004) and Rizzi and Bocci (2017) try to incorporate the syntactic information and discourse under the name of cartography. The intent of this cartography is to display the universal syntactic structure in a map-like manner and to connect discourse information structures such as topic and focus with the structure.

Several functional categories are assumed in the left peripheral part where the discourse informational structure is connected to the syntactic structure. This paper shows that in the left peripheral field a functional category concerning mood and modality called “MoodP” is inductively derived from a variety of syntactic phenomena and is incorporated into the cartography of left periphery. This paper also shows that by presenting the consequences of occurrence of MoodP, such features as  $\varphi$ -features, including features concerning mood and modality, neg-feature, and tense feature, are stratified and all uniformly inherited from MoodP (not C) to T (in the case of neg-feature, the head of NegP) in the sense of Chomsky (2000, 2008), though the types of the feature inheritance is parametrized as presented in Miyagawa (2010, 2017). The feature inheritance from MoodP to T bears by-products. One of the by-products is complementizer agreement exhibited in many languages. It is shown that this agreement phenomenon is closely related to the feature percolation from T to C (more precisely, Fin) caused by requirement of the Optimality Theoretic constraint called

“Percolation” in Distributed Morphology, a grammatical level between Narrow Syntax and PF Interface, reducing the burden of the computation concerning agreement in Narrow Syntax.

## 2. Left Peripheral Field

In the basic framework of cartography, sentence structure is considered to consist of the following three areas.

- (1) Peripheral field: the area concerning scope-discourse including information of speaker and listener
- Inflectional field: the area involving grammatical categories such as agreement and inflection
- Lexical field: the area of lexical category involving thematic and semantic roles

The structure presented above is specifically described as follows (cf. Rizzi (1997, 2004) and Rizzi and Bocci (2017)):

- (2) [ ForceP [ TopP\* [ FocP [ TopP\* [ Q [ FinP [TP [ vP ...  
(\* Indicates that the projection can occur repeatedly)

ForceP, TopP\*, FocP, TopP\*, Q, and FinP are equivalent to conventional CPs, and form a rich internal structure consisting of various functional categories. Conventional inflectional field corresponds to TP and conventional lexical field to vP. At the left end of the peripheral field, Force means illocutionary force. Top (Topic) is the position occupied by elements which are interpreted as the topic in a sentence. Foc (Focus) takes in focused elements. Q (Question) has wh-phrases in wh-interrogatives.<sup>1</sup> Fin (Finite) has elements that represent finite and non-finite forms of sentences.

As mentioned above, a rich internal structure composed of

various functional categories is formed in the left peripheral portion, but there are categories that may be newly added to these functional categories if linguistic consideration is added.

Consider that possibility based on English language materials. In an English interrogative sentence, as in the following example, it is possible to put appositive elements after a *wh*-phrase, but they have to be disjunctive, not conjunctive elements.

- (3) They asked who, {John or Bill / \*John and Bill}, could help her.

In (3), a *wh*-phrase can be followed by a disjunctive element, which is due to the fact that the interrogative sentence has the meaning that the truth value of the interrogative part of the sentence is not sure, i.e. uncertain in meaning (uncertainty of truth value). This is why it is semantically connected to the disjunctive element. The meaning that this truth value is uncertain is related to the expression of mood and modality. Masuoka (2007) suggests that a particle “*ka*” in Japanese is a marker of uncertainty and one of the expressions of uncertainty of truth value is “question” or “asking oneself.”

- (4) Taro-ha kinou nani-o kaimasita ka?  
Taro yesterday what bought Part.  
‘What did Taro buy yesterday?’

There are other expressions of uncertainty, which can be broadly divided into recognition systems and emotional systems and can be subdivided as follows:

- (5)
- |                    |   |   |
|--------------------|---|---|
| Uncertainty marker | { | Recognition system:<br>uncertainty, consent/<br>comprehension, discovery<br><br>Emotional system:<br>surprise/exclamation/<br>rapture, dissatisfaction,<br>rhetorical question/pseudo-<br>rhetorical question |
|--------------------|---|---|

According to the analysis of Masuoka (2007), the meaning of not knowing the truth value is classified as a recognition system for indeterminate markers. Moreover, Masuoka (1991) suggests that modality can be divided into several types and they have their own hierarchy as follows:

- (6) modality of politeness/communication attitude > modality of representation > modality of value judgement/truth value > modality of explanation > modality of appreciation/tense > modality of focus

The category related to the meaning of uncertainty concerning truth value discussed here is assumed to be modality in the sense of Masuoka (2007). Although modality is often distinguished from mood in the literature, it is tentatively integrated into mood here for convenience. Furthermore, mood is projected as MoodP above FinP in the left peripheral part in the cartography.

However, the projection label of MoodP has already been proposed. This projection is shown in the analysis of Cinque (1999). He asserts that adverbs reflect subjectivity and have the following hierarchy:

- (7) MoodP<sub>speech act</sub> > MoodP<sub>evaluative</sub> > MoodP<sub>evidential</sub> > MoodP<sub>epistemic</sub> > TP (Past) > TP (Future) > MoodP<sub>irrealis</sub> > ModP<sub>alethic</sub> > AspP<sub>habitual</sub> > AspP<sub>repetitive</sub> > AspP<sub>frequentative</sub> > ModP<sub>volitional</sub> > AspP<sub>celerative</sub> > TP (Anterior) > AspP<sub>terminative</sub> > AspP<sub>continative</sub> > AspP<sub>retrospective</sub> > AspP<sub>proximative</sub> > AspP<sub>durative</sub> > AspP<sub>generic/progressive</sub> > AspP<sub>prospective</sub> > ModP<sub>obligation</sub> > ModP<sub>permission/ability</sub> > AspP<sub>completive</sub> > VoiceP > AspP<sub>celerative</sub> > AspP<sub>repetitive</sub> > AspP<sub>frequentative</sub>

The MoodP proposed here has the same label as the MoodP Cinque (1999) proposes, but it is not the same in that the MoodP proposed here can express a mental state that the truth value of the sentence is not certain and it projects up on FinP. Therefore, we propose that uncertainty of truth value is incorporated into the hierarchy presented above and the mood and modality occur clumping together as MoodP, and that MoodP projects up on FinP, to be more precise, between Q and FinP.

The analysis presented above is inductively introduced based on the phenomena observed in Germanic languages, called doubly filled-COMP. Although doubly filled-COMP is not allowed in standard English, there are a lot of Germanic languages that allow it, for example, Dutch, Frisian, West Flemish, Swiss German, Icelandic, Norwegian, Swedish, Danish, etc. (see de Haan and Weerman 1986; Reuland 1990; Haegeman 1992; Hoekstra 1993, etc.). Let’s take a look at Dutch among these languages.

- (8) Dutch
- a. Ik vraag me af of dat Ajax de volgende ronde halt.  
I ask me PRT if that Ajax the next round reaches  
‘I wonder whether Ajax will make it to the next round.’
- b. Ze weet wie of dat hij had willen opbellen.  
she knows who if that he had wanted call  
‘She knows who he wanted to call.’

Bayer (2004: 65)

The examples presented above are all indirect interrogative sentences. They exhibit doubly-filled COMP and furthermore a particle *of* is introduced between the *wh*-phrase and the complementizer. In particular, in (8b), the particle *of* follows the *wh*-phrase, after which the complementizer emerges. The particle *of* is considered to be a particle bearing the meaning that the truth value is unknown or uncertain. According to the cartography, the *wh*-phrase occurs in the Spec position of Q and the complementizer occurs in Fin, so the particle *of* occurs

between them as shown below.

- (9) [<sub>ForceP</sub> [ Wh Q [<sub>MoodP</sub> of [<sub>FinP</sub> [<sub>TP</sub> [<sub>VP</sub> ...

And the particle *of* is considered to occur in the head position of MoodP.

Similar phenomenon concerning introduction of a particle exhibiting uncertainty of truth value is also observed in Serbo-Croatian.

- (10) a. Dali da Vesna pročitā ovu knjigu?  
 whether SUBJ Vesna read 3SG this book  
 ‘Should Vesna read this book?’  
 b. Kojuu knjigu da Vesna pročitā?  
 which book SUBJ Vesna read 3SG  
 ‘Which book should Vesna read?’

Isac and Jakab (2004: 328)

In the example presented above, a *wh*-phrase is followed by a mood marker *da* bearing the meaning of uncertainty of truth value.

As described above, in the interrogative sentences of English, unlike Dutch and Serbo-Croatian, MoodP does not manifest any elements like a particle *of* in Dutch. This is one of the language variations. In the case of English, a particle bearing the meaning of uncertainty of truth value occurs in MoodP as a covert element which is a counterpart of *of* in Dutch and *da* in Serbo-Croatian.

### 3. Negation and Negative Polarity

As mentioned above, MoodP projects up between Q and FinP and the empty element bearing uncertainty of truth value in its head position in English interrogatives. The fact that the empty element bears uncertainty will induce negative meaning from the uncertainty by analogy. From this analogy, we suppose that negation can be a member of MoodP and is integrated into the hierarchy of mood and modality.

Here we discuss a consequence of the existence of negation in MoodP. There is a case where although negative elements don't realize in the sentence, negative polarity items can be licensed. A case in point is interrogatives.

- (11) a. Do you have any questions?  
 b. Have you ever been to America?

In the examples presented above, negative polarity items are licensed despite no explicit negative elements c-commanding them. In the former section, an empty element bearing uncertainty of truth value occurs in the head of MoodP. Uncertainty connotes negative meaning which indicates not knowing the truth value. If it has a negative meaning, then it serves as a negative element licensing negative polarity items despite its covert realization.

- (12) [<sub>ForceP</sub> [ Q [<sub>MoodP</sub> Mood(uncertainty) [<sub>FinP</sub> Do-Fin [<sub>TP</sub> you  
 [<sub>VP</sub> have any questions ]]]]]]

In the above example, an empty element bearing uncertainty of truth value in the head of MoodP activates as an empty negative element and can c-command a negative polarity item, ruling in the sentence.<sup>2</sup>

Let's consider conditional sentences next. Conditional sentences include negative polarity items just like interrogatives.

- (13) a. If you have any problems, please let me know.  
 b. If you ever come to Japan, please come to my house.  
 c. If I had any money, I would buy this car immediately.

In the above examples (13a, b), the speaker utters the *if*-clause being uncertain as to whether the proposition can be true or not. This uncertainty occurs in MoodP. In the above examples, *if* bears uncertainty.

(14) [<sub>ForceP</sub> [<sub>MoodP</sub> If [<sub>FinP</sub> Fin [<sub>TP</sub> you [<sub>VP</sub> have any problems ]]]]]  
*If* bearing uncertainty c-commands a negative polarity item and thus licenses the negative polarity item.<sup>3</sup> In (13c), the proposition in the *if*-clause expresses a counterfactual event. This meaning of counterfactual event bears negative meaning and realizes in *if*. *If* c-commands the negative polarity item, ruling in the sentence.<sup>4</sup>

Consider the case where negative polarity items occur despite no overt negative elements in the clause as in the case of *if*-clause.

- (15) a. I doubt that he ever said anything like that.  
 b. He expressed strong doubt that they said anything like that.

In the examples presented above, although negative elements like *not* do not occur, the negative polarity items can be licensed. In (15a), a negative polarity item occurs in the complement of the verb *doubt*, while a negative polarity item occurs in the complement of the noun *doubt* in (15b). Although there is a difference of parts of speech, i.e. verb vs. noun, the negative polarity item is in the complement of the element bearing negative meaning in common. In both cases, the subject in the matrix clause bears doubt in mind as to the proposition of the complement of *doubt*. The existence of doubt leads to uncertainty and thus activates a category expressing uncertainty in MoodP.

- (16) I doubt [<sub>ForceP</sub> [<sub>MoodP</sub> Mood(uncertainty) [<sub>FinP</sub> that-Fin [<sub>TP</sub>  
 he ever said anything like that ]]]]

In the above example, the category expressing uncertainty in MoodP c-commands the negative polarity item. The same explanation is true of the following case, where a verb in the matrix clause bearing a negative meaning can license the negative polarity item in its complement (cf. Laka 1990).

- (17) He denies that he ever said anything like that.



you Nom. bad seem today Top. early  
 kaette neru koto da.  
 go home sleep Part. Part.  
 ‘You look pale. You should go home and go to bed  
 early today.’

In (23a), where the sentence is exclamative, *koto* is employed as a mood marker. The particle *ka* is optionally used. *Ka* can occur as a marker expressing uncertainty, consent, comprehension, discover, surprise, exclamation, rapture, dissatisfaction, rhetorical question, and pseudo-rhetorical question, as mentioned before. A question particle *ka* is also introduced to the head of ForceP as an interrogative marker. However, *ka* is used as an exclamative marker in the case of (23a). In (23b), *koto* is employed to express command. *Koto* in (23c-e) is also associated with mood. The Japanese *koto* is originally a noun. Japanese mood or modality tends to be bound up with noun, and thus it may be the case that *koto* is employed in MoodP. From these examples, it follows that nominal elements are associated with mood.

Other languages introduce complementizers to express mood or modality.

## (24) German

## a. Dissatisfaction

Daß du mir doch nie glauben willst!  
 that you me after all not believe will  
 ‘You don’t believe me at all.’

## b. Supplication

Daß er nur rechtzeitig kommt!  
 that he only in time comes  
 ‘May he come in time!’

The German complementizer *daß* is derived from demonstratives and thus has a nominal nature. The following examples show that complementizers are introduced in matrix clauses to express exclamation and imperative.

## (25) Exclamative clauses

## a. At du junne gøe det! (Danish)

That you could do it  
 ‘How could you do such a thing!’

## b. Daß mir das nicht früher aufgefallen ist! (German)

That me that no earlier struck is  
 ‘To think that it didn’t strike me earlier!’

## c. Qu’elle est bavarde! (French)

That she is talkative  
 ‘What a chatterbox she is!’

## d. Að María skuli elska Jón (Icelandic)

That Mary shall-SUB love John [SUB = subjunctive]  
 ‘That Mary should love John!’

Radford (1988: 297)

## (26) Imperative clauses

## a. Qu’il aille se faire foutre! (French)

That he go-SUB himself make do  
 ‘Let him go and get stuffed.’

## b. Daß du ja die Füße vom Tisch läßt! (German)

That you yes the feet off table keep  
 ‘Keep your feet off the table!’

## c. Que vengan todos! (Spanish)

That come all  
 ‘Let them all come.’

Complementizers are sometimes associated with uncertainty of truth value in interrogatives.

## (27) Warum da-ma (mir) noch Minga fahr-n (Bavarian)

why that-(1PL) we to Munich drive-(1/3PL)  
 ‘...why we drive to Munich’

Bayer (1984: 251)

## (28) a. Quoi que tu as fait? (Quebec French)

what that you have done

## b. Chi che t’è vest? (Italian Romagnolo dialect)

who that you have seen

Haegeman (1991: 111)

## c. Cén bhean a phósadh sé? (Irish)

Which woman that would-marry he

‘Which woman would he marry?’

Radford (1988: 501)

From these examples, it follows that when mood activates in MoodP, it can be associated with a nominal element or a complementizer as a mood marker.

## 5. Agreement

Agreement is a recognition system to express the relation of fact between things and their attributes or predicates. Therefore, we tentatively suppose that agreement is related to mood system and  $\varphi$ -features specified in MoodP are inherited from MoodP to T in the sense of Chomsky (2000, 2008).  $\Phi$ -features involve number, gender, and person. On the basis of Greenberg (1963), these  $\varphi$ -features form hierarchy, i.e. feature hierarchy.

## (29) person &gt; number &gt; gender

These  $\varphi$ -features, though we cannot demonstrate where they are in MoodP now, are directly inherited from MoodP to T keeping their hierarchy.

(30) [<sub>ForceP</sub> Force [ Q [<sub>MoodP</sub> Mood [<sub>FinP</sub> Fin [<sub>TP</sub> T [ ... ]]]]]]

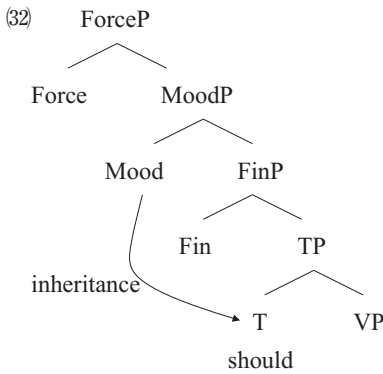
└──────────────────┘  
 ↑  
 $\varphi$ -features

In English, the complement of verbs expressing demand, proposal, request, hope, desire, and so on is associated with subjunctive mood, and the verb in it is required to be bare

infinitives in American English and is required to introduce *should* in British English. This *should* in British English is so-called emotional *should*.

- (31) a. We desire that they (should) visit us more often.
- b. They proposed that the hospital (should) be built.
- c. We want that they (should) come to the party.

Demand, proposal, request, hope, and desire are closely related to mood. Therefore, they get active in MoodP and are inherited to T in the complement Mood dominates. Modal auxiliaries like *should* occur in T. Realization of *should* in T of the subjunctive complement is a typical example of overt feature inheritance from MoodP.

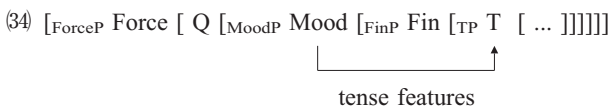


In Early Middle Japanese where the same pattern as in British English was exhibited, an auxiliary, *mu*, occurred in T in tandem with a mood marker *ka*.

- (33) Early Middle Japanese
- |                          |        |         |      |       |
|--------------------------|--------|---------|------|-------|
| Toriidete-mo             | sama   | asikara | mu   | ka.   |
| take something out Part. | manner | bad     | Aux. | Part. |
- ‘The manner of his / hers will be bad.’
- (*Ochikubo Monogatari (The Tale of Ochikubo)*)

This is also a typical example of the feature inheritance from MoodP to T.

Tense specification, as mentioned before, is also a cognition operation. Therefore, tense features are inherited from MoodP to T, as in the same manner presented above.

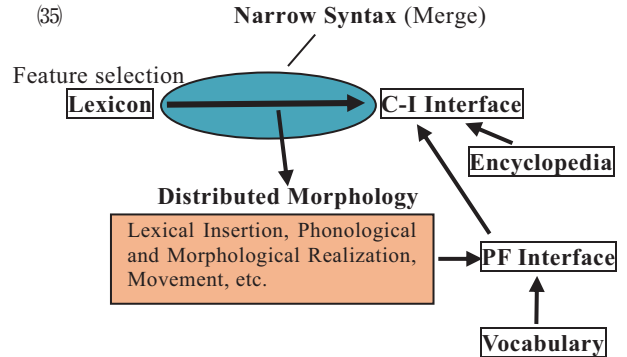


To sum up, features concerning mood, modality, agreement, and tense are all inherited from MoodP to T.

## 6. Complementizer Agreement

Now let’s go back to  $\phi$ -feature inheritance. Under the recent Minimalist Program, T in English is assumed to be weak. The weakness of T in English requires  $\phi$ -feature inheritance to T. However, we suggest here that language variation should not be treated in Narrow Syntax and thus should be treated in

Distributed Morphology, which is proposed by Halle and Marantz (1993) and Harley and Noyer (1998, 1999).  $\Phi$ -feature inheritance from MoodP to T is implemented to not only English but to all languages.



The  $\phi$ -features provided by MoodP are realized as morphological forms in Distributed Morphology and the morphological variations concerning them are determined in there.

The argument that the  $\phi$ -features of T are inherited from C (more precisely, MoodP) is mainly based on the fact that some of Germanic languages (especially the West Germanic languages) exhibit complementizer agreement with T as to  $\phi$ -features.

- (36) West Flemish
- a. Kpeinzen dan-k (ik) morgen goan.  
I-think that-I (I) tomorrow go  
‘I think that I’ll go tomorrow.’
  - b. Kpeinzen da-j (gie) morgen goat.
  - c. Kpeinzen da-se (zie) morgen goat.
  - d. Kpeinzen da-me (wunder) morgen goan.
  - e. Kpeinzen da-j (gunder) morgen goat.
  - f. Kpeinzen dan-ze (zunder) morgen goan.
  - g. Kpeinzen da Valere morgen goat.
  - h. Kpeinzen dan Valere en Pol morgen goan.

Haegeman (1992: 49)

Subject agreement occurs on the verb and C inflects for  $\phi$ -features of the local subject. West Flemish, as shown above, has a full, i.e. non-defective, complementizer agreement.

More examples concerning complementizer agreement are as follows (the examples of (37)-(40) are from (Zwart (1997)):

- (37) South Hollandic
- |          |      |      |        |
|----------|------|------|--------|
| ...datte | ze   | ziek | benne  |
| that-PL  | they | sick | are-PL |
- ‘...that they are sick.’

- (38) Frisian
- |           |     |         |          |
|-----------|-----|---------|----------|
| ...dat-st | do  | jûn     | komst    |
| that-2SG  | you | tonight | come-2SG |
- ‘...that you’re coming tonight.’

- (39) East Netherlandic
- |          |    |       |          |
|----------|----|-------|----------|
| ...datte | wy | piano | speult   |
| that-1PL | we | piano | play-1PL |

‘...that we play the piano.’

(40) Brabantish

...dadde gullie host komt  
that-2PL you almost come-2PL  
‘...that you are almost coming.’

Much attention has been paid to these phenomena. The main concern is to analyze these as overt agreement between C as a prober and T as a goal in Narrow Syntax (e.g. Zwart 1993; Carstens 2003; Van Koppen 2005). The phenomena, furthermore, are treated as a post-syntactic process (e.g. Ackema and Neelman (2004) and Fuß (2008)).

However, we suggest here that complementizer agreement is not the operation in Narrow Syntax but feature percolation from T to C (to be more precise, Fin). Many languages exhibit feature percolation as follows:

(41) Hidi-Urdu

Vivek-ne [kitaab parh-nii] chaah-ii  
Vivek-Erg book.F read-Inf.F want-Pfv.F.SG  
‘Vivek wanted to read the book.’

Bhatt (2005: 760)

(42) Itelmen

tʰ-əntxa-čəPn [mił okno-Pn sop-es]  
1SG-forger-3PL.OBJ all window-PL close-INF  
‘I forgot to close all the windows.’

Bobaljik and Wurmbrand (2003: 1)

As shown above, the objects in the embedded clause are in an agreement relation with the verbs of the same clause and moreover, the verbs in the matrix clause exhibit  $\varphi$ -feature agreement with the objects. This fact suggests that the  $\varphi$ -features of the objects in the embedded clause percolate up through the embedded clause even to the matrix clause. The same feature percolation can be observed in noun phrases.

(43) German

a. der große Tisch  
the-MASC.SG big-MASC.SG desk-MASC.SG  
b. die rotten Dächer  
the-NEU.PL red-NEU.PL roof-NEU.PL

(44) Italian

a. la mia casa  
the-FEM.SG my-FEM.SG house-FEM.SG  
b. il mio gatto  
the-MASC.SG my-MASC.SG cat-MASC.SG

As shown above, in German and Italian,  $\varphi$ -features percolate up to the upper part of the projection in the noun phrases. Therefore, in the case of complementizer agreement,  $\varphi$ -features are directly inherited from MoodP to T and in a reflex manner they percolate up from T to Fin where complementizers occur as a by-product of the feature inheritance because the pass between Fin and T is transparent in the sense of Grimshaw (1991).

However, there are some cross-linguistic variations about this complementizer agreement. Selection as to which feature is determined among person, number, and gender in the complementizer agreement depends on languages. In Najdi Arabic, the complementizer agrees with the embedded subject in person, number, and gender.

- (45) a. ta-Qatiqid inna-ha sawwa-t al-akil  
2<sub>SG</sub>-think that-3<sub>SG-FEM</sub> make.PERF-3<sub>SG-FEM</sub> the-food  
‘You think that she made the food.’  
b. ta-Qatiqid inna-hum saww-aw al-akil  
2<sub>SG</sub>-think that-3<sub>PLI.MASC</sub> make.PERF-3<sub>PL.MASC</sub>  
the-food  
‘You think that they made the food.’

Lewis (2013)

In Katwijk Dutch, complementizer agreement occurs concerning number between C and a local subject.

(46) Katwijk Dutch

- a. ... as ik/jij/hij hoor(t) ...  
when I/you/he hear(s)  
‘...when I/you/he hear(s) ...’  
b. ... as-e we/jollie/ze hore ...  
when-PL we/you/they hear  
‘...when we/you/they hear ...’

Barbiers et al. (2006)

In Limburgian, complementizer agrees with an embedded 2SG-subject.

- (47) a. Ich denk de-s doow Marie ontmoet-s  
I think that-2SG you.SG Maie meet-2SG  
‘I think that you will meet Marie.’  
b. Ich dink de-s [toow en Marie] kump.  
I think that-2SG you.SG and Marie come-PL.  
‘I think that you and Marie will come.’

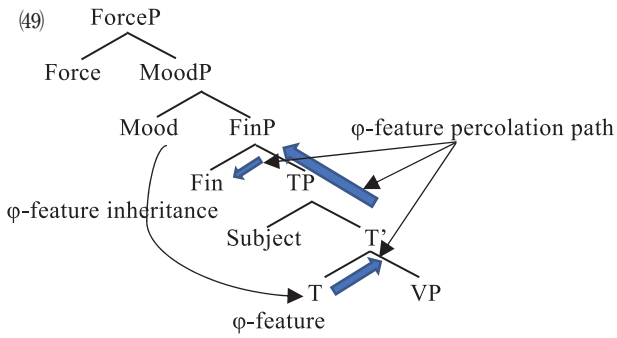
In Bavarian as well, complementizer agreement occurs only concerning 2SG-subjects and 2PL-subjects.

- (48) a. (I frog’ me) ob-sd ned du des mocha kansd  
I ask myself whether-2SG not you this make could 2SG  
‘I ask myself whether you could not make it.’  
b. wei-ts iw t’pruk khumt-Ø sea-ts s’witshaus  
when-2PL over the-bridge come see-2PL the-tavern  
‘When you cross the bridge, you see the tavern.’

Weiss (2005)

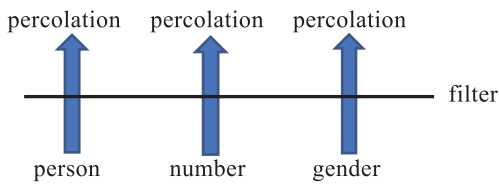
Fuß (2003: 5)

All the examples shown above exhibit  $\varphi$ -feature percolation between T and C in common.

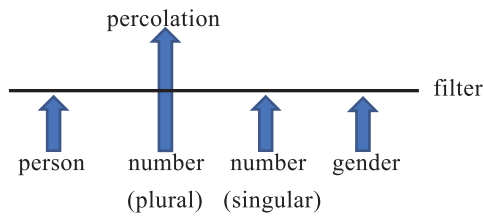


However, some features among  $\varphi$ -feature are prevented from percolating from T. That is, some  $\varphi$ -features are filtered out as follows:

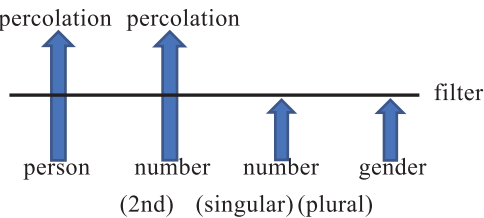
(50) West Flemish-Najdi Arabic Type



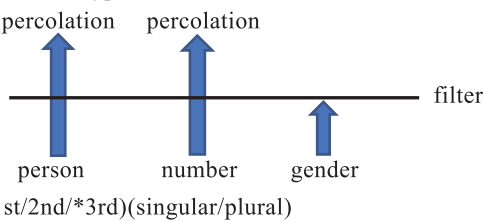
(51) Katwijk Dutch Type



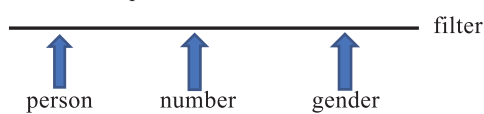
(52) Limburgian Type



(53) Bavarian Type



(54) Non Complementizer Agreement Languages  
no percolation



Features of languages bear hierarchy and the hierarchy exerts a potent influence on grammatical operation. Constraints in Optimality Theory form their own hierarchy and the interaction among them provides an optimal output. We propose here that the filter hindering  $\varphi$ -feature percolation from T to C is reduced

to the interaction among some Optimality Theoretic constraints operating in Distributed Morphology and the hierarchy they produce.

The basic idea of Optimality Theory (OT) is that UG consists largely of a set of constraints on representational well-formedness, from which individual grammars are constructed. The constraints operating in a particular language are conflicting. Many of the constraints which define a particular grammar are frequently violated in the actual forms of the language. Therefore, the grammar of the language consists of the constraints together with a general means of resolving their conflicts and has a means for precisely determining which input best satisfies a set of constraints; that is, the grammatically well-formed structures are those that optimally satisfy the set of constraints.

OT relies on a notion of constraint interaction whereby the satisfaction of one constraint can be designated to take absolute priority over the satisfaction of another. When a choice must be made between satisfying one constraint and another, the stronger must take priority. The result is that the weaker will be violated in a well-formed structural representation. When one constraint  $C_1$  dominates another constraint  $C_2$ , the relation between them is stratified as  $C_1 \gg C_2$ . The ranking defining a grammar is total, and thus the hierarchy determines the relative dominance of every pair of constraints as follows:

$$(55) C_1 \gg C_2 \gg \dots \gg C_n$$

Violations of a lower ranked constraint may be tolerated in order to satisfy a higher ranked constraint. Grammar can have equally ranked constraints, that is, formation of a constraint tie. Two constraints are not ranked with respect to each other. In this case, they belong to the same stratum as in the following representation:  $\{C_1, C_2\}$ . This stratum leads to optionality. The relation between an input and an output is mediated by two formal mechanisms, Generator (GEN) and Evaluator (EVAL). GEN creates a candidate set of potential outputs for an input in which lexicon provides the particular underlying forms; EVAL selects the optimal output for the input from the candidate set, making use of a ranking of the violable constraints.

$$(56) C_1 > C_2 > C_3 > C_4$$

Candidates	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>
P <sub>1</sub>	*!	**		
P <sub>2</sub>		*!		
P <sub>3</sub>				*
P <sub>4</sub>			*!	

(57)  $C_1 > \{C_2, C_3\} > C_4$

Candidates	$C_1$	$C_2$	$C_3$	$C_4$
$P_1$	*!			
$P_2$		*		
$P_3$			*	
$P_4$		*	*	

Each language has its own ranking for constraints. Systematic variation between languages is derived from differences between constraint rankings; that is, languages differ primarily in how they rank the universal constraints in strict dominance hierarchies that determine the circumstances under which constraints are violated and resolve the conflicts of them. The formal characterization of language change through time and dialect variation is that universal constraints are reranked. Part of acquiring a language is acquiring the critical ranking of that language and the lexicon. The formal characterization of language change in the course of learning is also reduced to the reranking of constraints and the substantive knowledge of the lexicon.

We propose that some OT constraints operate in Distributed Morphology and occurrence of  $\varphi$ -feature percolation depends on specified hierarchy and interaction among them. Systematic variation concerning  $\varphi$ -feature percolation is derived from differences between the constraint rankings. The constraint that induces feature percolation is called here as follows:

(58) Percolation: features percolate up.

Domination of  $\varphi$ -feature hierarchy by this constraint induces  $\varphi$ -feature percolation, while dominance of this constraint by  $\varphi$ -feature hierarchy induces no  $\varphi$ -feature percolation as in the case of languages like English.

Now let's take a look at language variation of  $\varphi$ -feature percolation. West Flemish-Najdi Arabic Type languages have constraint hierarchy as follows:

(59) West Flemish-Najdi Arabic Type:

Percolation  $>$  {Number, Person, Gender}

This hierarchy exhibits percolation of all kinds of  $\varphi$ -feature.

Katwijk Dutch Type languages have the constraint hierarchy as follows:

(60) Katwijk Dutch Type:

Percolation  $>$  Number [PL  $>$  SG]  $>$  {Person, Gender}

Prince and Smolensky (1993) develop universal constraint sub-hierarchies. In light of this, we posit that  $\varphi$ -features bear sub-hierarchies. That is, it consists of sub-features and a stratified hierarchy of them is formed. The above constraint hierarchy allows only percolation of plural number feature, since the number feature PL dominates the number feature SG.

Limburgian Type languages have the constraint hierarchy as follows:

(61) Limburgian Type:

Percolation  $>$  {Person [2nd  $>$  {1st, 3rd}], Number [SG  $>$  PL]}  $>$  Gender

The person feature 2nd dominates 1st and 3rd person and the number feature SG dominates the number feature PL. This hierarchy induces percolation of 2nd person and singular number features.

Bavarian Type languages have the constraint hierarchy as follows:

(62) Bavarian Type:

Percolation  $>$  {Person [2nd  $>$  {1st, 3rd}], Number}  $>$  Gender

The person feature 2nd dominates 1st and 3rd person. This hierarchy induces percolation of 2nd person and number features.

No Complementizer Agreement languages have the constraint hierarchy as follows:

(63) No Complementizer Agreement Languages:

{Person, Number, Gender}  $>$  Percolation

This hierarchy induces no percolation of  $\varphi$ -features, hence no complementizer agreement between C and T. All the constraint rankings shown above are in order below.

(64) Constraint Ranking

Language	Constraint Ranking
West Flemish	Percolation $>$ {Number, Person, Gender}
Najdi Arabic	Percolation $>$ {Number, Person, Gender}
Katwijk Dutch	Percolation $>$ Number [PL $>$ SG] $>$ {Person, Gender}
Limburgian	Percolation $>$ {Person [2nd $>$ {1st, 3rd}], Number [SG $>$ PL]} $>$ Gender
Bavarian	Percolation $>$ {Person [2nd $>$ {1st, 3rd}], Number} $>$ Gender
English	{Person, Number, Gender} $>$ Percolation

However, languages that exhibit  $\varphi$ -feature percolation optionally induce it. Lapscheure Dutch does not always induce  $\varphi$ -feature percolation as follows:

(65) Lapscheure Dutch

a. Kpeinzen {**dat zelfs Valère**} zukken boeken niet leest.

I think that even Valère such books not reads

b. Kpeinzen {**\*da-n<sup>??</sup> dat zukken boeken**} zelfs Valère niet leest.

I think that-<sub>3P,PL</sub>/that such books even Valère not reads

'I think that even Valère would not read such books.'

Haegeman and Van Koppen (2012: 446)

In (65b), the object intervenes between C and the local subject, and  $\varphi$ -feature percolation from T to C does not occur.

On the other hand, Gmunden dialect, a variant of Bavarian, induces  $\varphi$ -feature percolation despite the existence of an intervenor between C and the local subject.

(66) Bavarian, Gmunden dialect

a. **Warum-st** sein Friend uns **DU** net vorgstöhtho-st,

vasteh i a net.  
 Why-<sub>2P.SG</sub> his friend us you not introduced have-<sub>2P.SG</sub>  
 understand I too not  
 ‘Why you didn’t introduce his friend to us, I don’t  
 understand either.’

- b. *Wos hot da Hannes gsogt, wo-st morgn DU mitbringa soid-st?*  
 What has the Hannes said, that-<sub>2P.SG</sub> tomorrow you with-bring should-<sub>2P.SG</sub>  
 ‘What did Hannes say that you should bring along tomorrow?’

Gruber (2008: 54)

The examples shown above suggest that language variations have optionality concerning percolation of  $\varphi$ -features. Optionality of grammatical operation is derived from the notion of constraint tie and thus languages exhibiting optionality of  $\varphi$ -feature percolation have the following constraint ranking, where Percolation and  $\varphi$ -features are in a tie relation.

(67) {[Person, Number, Gender], Percolation}

Complementizer agreement sometimes shows sensitivity concerning linear adjacency. Tegelen Dutch exhibits agreement between C and the first conjunct of the coordinated local subject.

(68) Tegelen Dutch.  
 ... de-s doow en ich ôs treff-e.  
 that-<sub>2P.SG</sub> [you<sub>SG</sub> and I]<sub>1P.PL</sub> each other<sub>1P.PL</sub> meet-<sub>1P.PL</sub>  
 ‘... that you and I meet each other.’

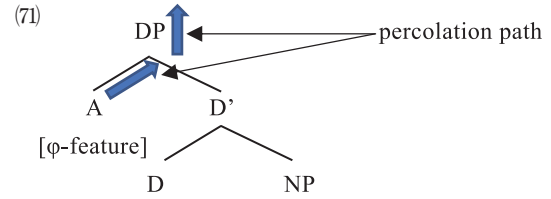
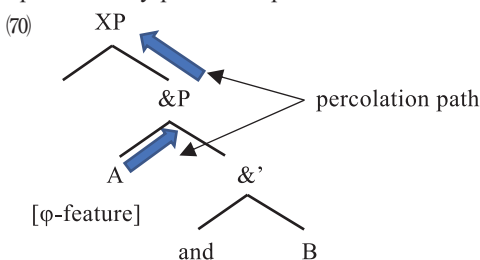
Van Koppen (2005: 174)

On the other hand, Lapscheure Dutch exhibits complementizer agreement between C and the external possessor in the local subject.

(69) Lapscheure Dutch  
 ... omda-n **die venten** toen juste **underen**  
 because-<sub>3P.PL</sub> those guys then just their  
**computer** kapot was.  
 computer broken was  
 ‘... because those guys’ computer broke just then.’

Haegeman and Van Koppen (2012: 444)

In these examples, complementizer agreement occurs between C and the upper nominal element in the local subject. This suggests that the  $\varphi$ -features of the upper element in the structure are preferentially percolate up.



This kind of feature percolation is due to the constraint that prioritizes feature percolation of the upper elements in the structure they belong to as follows:

(72) Percolation Superiority: feature percolation must be applied to the upper elements in the structure they belong to.

This constraint dominates the constraint, Percolation, in the languages presented above.

## 7 . Percolation of Other Features

We have seen the feature percolation of  $\varphi$ -features between T and C (more precisely, Fin). Feature percolation between T and Fin, however, is not restricted to  $\varphi$ -features. Some languages undergo percolation of other features than  $\varphi$ -features between T and Fin. In modern Irish, types of finite clauses (e. g. subordinate, relative, interrogative, negative clauses, and such) show up in complementizers. What makes the matter fascinating is that the complementizers have two forms, past and non-past, as illustrated below:

(73)	Non-pas	Past
Subordinating	go /gə/	gur /gər/
“Direct” relative	a /ə/	a /əi/
“Indirect” relative	a /ə/	ar /ərʲ/
Interrogative	an /ən/	ar /ərʲ/
Matrix negative	ní /nʲi:/	níor /nʲi:r/
Embedded negative	nach /nax/	nír /na:r/

Chung and McCloskey (1987: 218)

Some relevant examples are as follows:

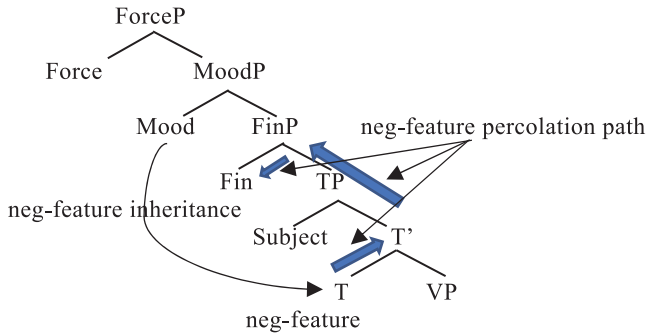
- (74) a. *Dúirt sé go dtiocfadh sé.*  
 say(Past) he Comp come(Condit) he  
 ‘He said that he would come.’  
 b. *an fear a labhrann tú leis.*  
 the man Comp speak(Pres) you with-him  
 ‘the man that you speak to’  
 c. *an fear ar labhair tú leis*  
 the man Comp speak(Past) you with-him  
 ‘the man that you spoke to’  
 d. *Ar chuir tú isteach ar phostanna ?*  
 Q put(Past) you in on jobs  
 ‘Did you apply for jobs?’  
 e. *Dúirt sé nár chuir sé isteach air.*  
 say(Past) he Neg put(Past) he in on-it

‘He said that he did not apply for it.’

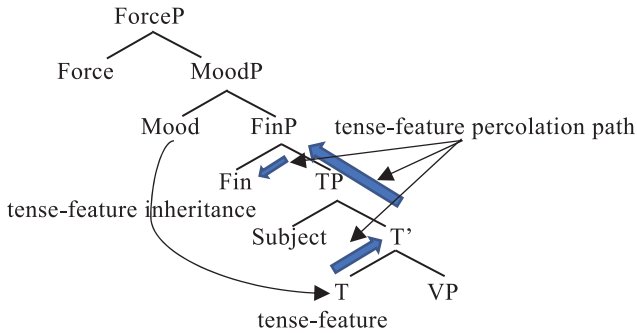
Chung and McCloskey (1987: 218)

The Irish examples concerning negation and tense specification in complementizers shown above suggest that feature percolation of neg-feature and tense feature from T to Fin is implemented in Irish.

(75) a. Neg-feature



b. Tense feature



In Irish, neg-feature and tense feature are inherited from MoodP to T and the constraint Percolation dominates neg-feature and tense feature. Therefore, they percolate up from T to Fin in a reflex manner as a by-product of the feature inheritance of tense and neg features from MoodP to T.

(76) Percolation > {Tense, Negation}

We have seen the mood and modality concerning uncertainty, presupposition, subjunctive mood, emotion (exclamation, disappointment, and remorse, etc.), agreement, tense, and negation which occur in MoodP. However, their hierarchy has not been determined. In the sense of Chomsky (1995), agreement dominates tense and negation, and tense dominates negation. In the development of modal auxiliary, as mentioned before, a modal auxiliary of root meaning is acquired first and then a modal auxiliary of epistemic meaning is acquired, forming the hierarchy Modal(epistemic) > Modal(root). This hierarchy was exhibited in the history of English and was explicitly observed in Middle English in the development of modal auxiliary.

(77) I shall not konne answeze.

‘I shall not be able to answer.’

(Geoffrey Chaucer, *The Canterbury Tales*, B 2902)

This fact suggests that the first acquired feature is dominated by

the subsequently acquired feature. According to *The Oxford English Dictionary, the 2nd edition (OED)*, the feature concerning emotion was acquired early and the feature concerning subjunctive, the feature concerning negation, and the feature concerning presupposition followed in that order, as shown below.

(78) Subordinator

c 888 K. *Ælfred Boeth.* v. §3 Ic wat þæt ælc wuht from Gode com.

(79) Emotion (Exclamation, Sorrow, etc.)

c 888 K. *Ælfred Boeth.* ix, Eala þæt nanwuht nis fæste stondendes weorces.

(80) Subjunctive Mood

a 900 tr. *Bæda’s Hist.* ii. xi. [xiv.] §1 Þær se biscop oft..wæs, þæt he fulwade þæt folc in Swalwan streame.

(81) Presupposition

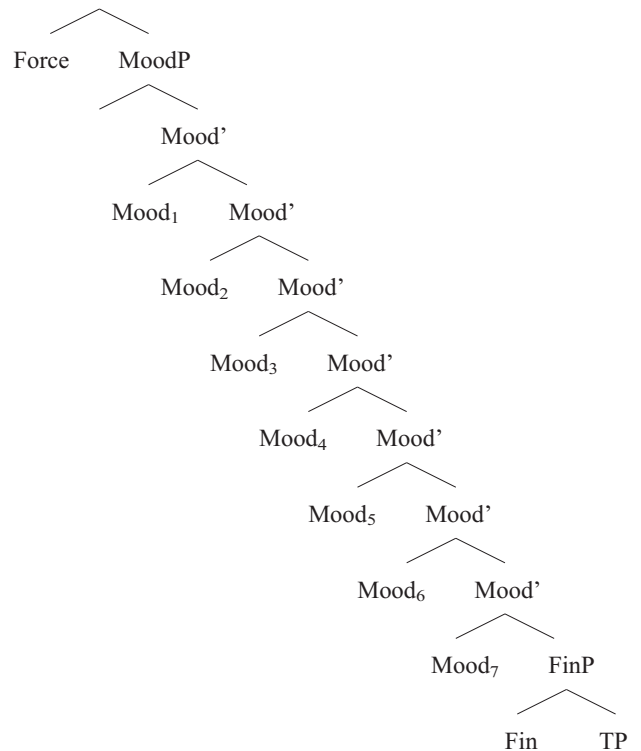
c 1000 *Ælfric Exod.* v. 2 Hwæt ys se drihten, þæt ic hym hiran scile and Israela folc forlætan?

(82) Negation

c 1000 *Ælfric Saints’ Lives* (1885) I. 378 Man gecwæman ne mæg twam hlafordum æt-somne þæt he ne forseo þone oðerne.

Tense dominates negation. From these facts, it follows that the features in MoodP we have proposed here are stratified as follows (cf. Masuoka 1991, 2007).

(83) ForceP



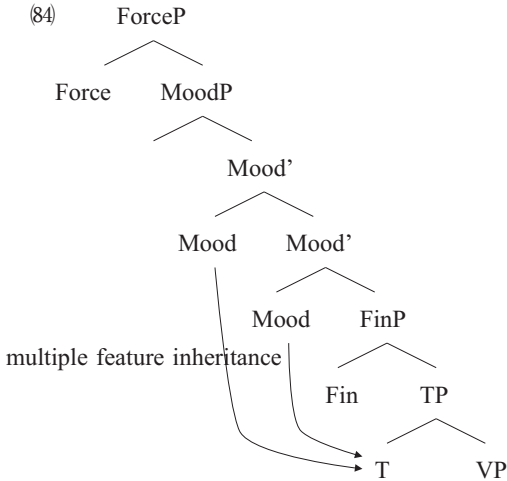
Mood<sub>1</sub>: Uncertainty

Mood<sub>2</sub>: Emotion

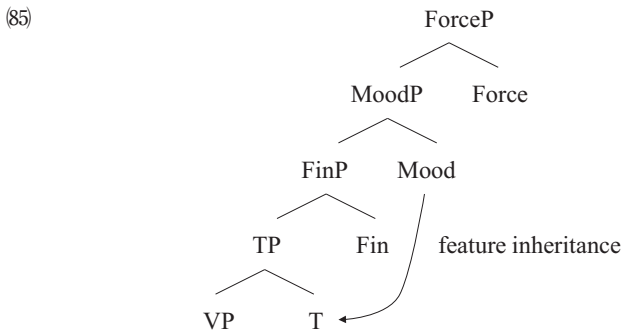
Mood<sub>3</sub>: Subjunctive Mood

- Mood<sub>4</sub>: Presupposition
- Mood<sub>5</sub>: Agreement
- Mood<sub>6</sub>: Tense
- Mood<sub>7</sub>: Negation

According to the requirement of feature inheritance, multiple feature inheritance can be implemented.



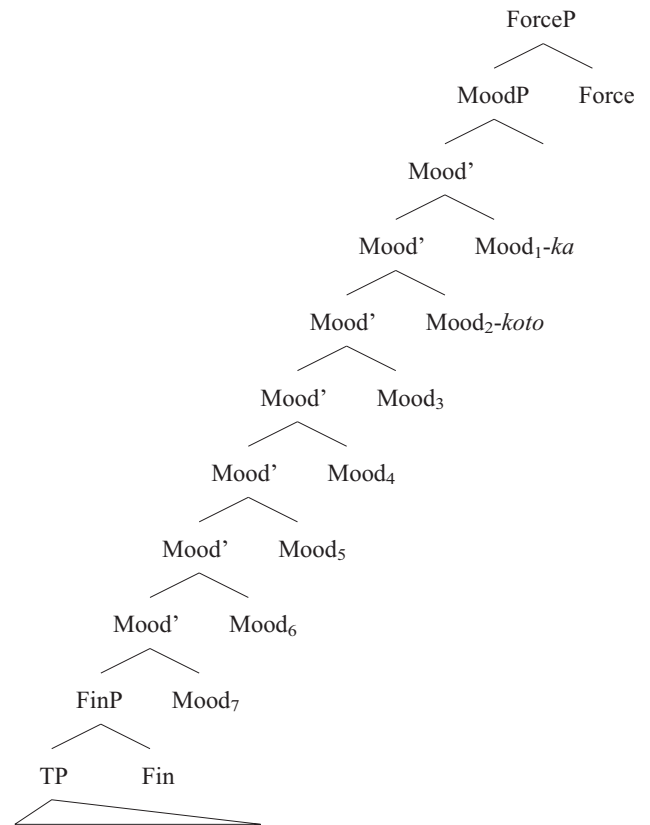
Languages like Japanese have head final structures, and have a right peripheral structure as follows:



As mentioned in the section 4, the Japanese particle *koto* is employed as a mood marker and *ka* can be employed as a marker of uncertainty, inducing the following hierarchy. The Japanese particle *koto* in the following exclamative sentence occurs as the mood marker of emotion.

- (86) a. Ano heyano nanto samui koto (ka). (emotion)  
 that room how cold Part. Part.  
 ‘How cold that room is!’

b.

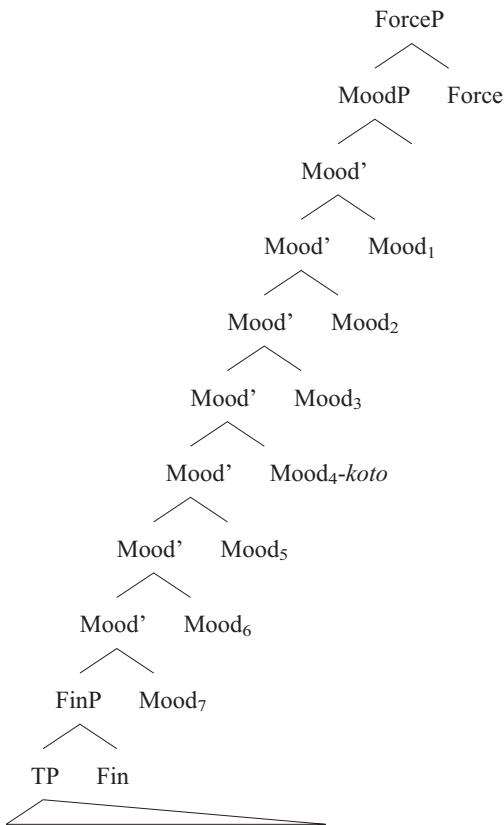


Ano heyano nanto samui

The Japanese *koto*, as mentioned before, can work as presupposition marker and thus is introduced in the head of MoodP bearing presupposition.

- (87) a. presupposition  
 [Taro-ga sono hon-o katta koto] ga zannen  
 Taro Nom. the book Acc. bought fact Nom. regretful  
 da.  
 Part.  
 ‘It is regretful that Taro bought the book.’

b.

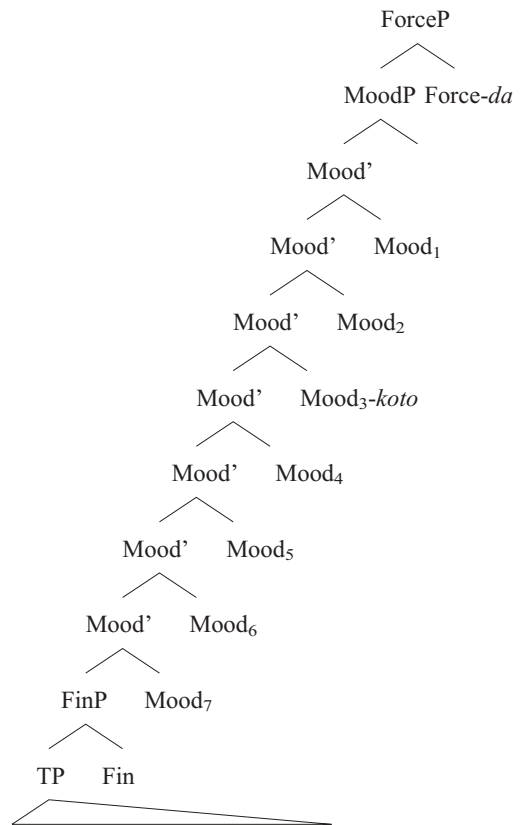


Taro-ga sono hon-o katta

The Japanese *koto* can work as subjunctive marker and is introduced in Mood<sub>3</sub> in this case.

- (88) a. Kaoiro ga warui youdakara kyou wa hayaku  
 you Nom. bad seem today Top. early  
 kaette neru koto da. (advice)  
 go home sleep Part. Part.  
 ‘You look pale. You should go home and go to bed  
 early today.’

b.



Kaoiro ga warui youdakara  
 kyou wa hayaku kaette neru

The features concerning the mood and modality presented above are inherited to T, and percolate up from T to Fin according to the parameter based on interaction of the Optimality Theoretic constraints and their rankings. The feature percolation occurs in Distributed Morphology and morphological realization concerning the features occurs in there as well. Feature percolation occurs in all languages. However, agglutinative languages such as Japanese, which are devoid of inflectional morphemes, do not exhibit complementizer agreement even if feature percolation occurs due to the requirement of the constraint Percolation.

## 8. Conclusion

This paper has shown that the projection MoodP associated with mood and modality occurs between Q and FinP in the left periphery of clauses. The field of MoodP forms a hierarchy of mood and modality. In the case of interrogatives, modality concerning uncertainty activates in MoodP and expresses uncertainty of truth value. The modality of uncertainty bears a negative meaning because the truth value is not determined. Therefore, it can c-command a negative polarity item in the sentence and can license it. In the case of conditional sentence, uncertainty activates in MoodP and expresses the uncertainty of

truth value. A negative polarity item can occur in a conditional sentence, which is due to the fact that uncertainty occurs in MoodP and licenses the negative polarity item. Negation, which can be treated as modality, also occurs in MoodP and thus can license a negative polarity item. Factive complement, sentence subject, and the complement of a noun involve definiteness. Definiteness is associated with presupposition. Presupposition involves mood and modality and thus occurs in MoodP. Agreement is also associated with mood and modality.  $\Phi$ -features as agreement feature are inherited from MoodP to T in Narrow Syntax. Complementizer agreement observed in many languages is a by-product of  $\varphi$ -feature inheritance from MoodP to T. The inherited  $\varphi$ -features percolate up from T to Fin. This percolation depends on the interaction of the constraint concerning percolation and  $\varphi$ -features. The difference of constraint rankings leads to the language variations of  $\varphi$ -feature percolation. Features of tense and negation are inherited from MoodP to T and these features can also percolate up from T to Fin. The language variation and idiolectal variation as to percolation of these features depend on the constraint concerning percolation and the constraint ranking of the features. The feature percolation from T to Fin occurs in Distributed Morphology and thus treatment of it is not required in Narrow Syntax, reducing the burden of the computation concerning agreement in Narrow Syntax.

The other features than the features presented above include command, advice, exclamation, remorse, and disappointment. These features concerning mood and modality are integrated into the field of MoodP and are stratified as follows:

- (89) Uncertainty > Emotion > Subjunctive Mood >  
Presupposition > Agreement > Tense > Negation

## Notes

<sup>1</sup> Rizzi and Bocci (2017) propose that a *wh*-phrase moves up to the Spec position of Int(errogative), and that the position of Q, more precisely, Q<sub>emb</sub>, serves as the position for the embedded question formation (this position was called Wh in Rizzi (2004)).

- (i) [ ForceP [ TopP\* [ Int [ FocP [ TopP\* [ Q [ FinP [ TP  
[ vP ...

However, we regard this Q position as the position for all *wh*-interrogatives for convenience here, contrary to the analysis of Rizzi and Bocci (2017).

<sup>2</sup> When in interrogatives, an empty element bearing uncertainty of truth value in MoodP activates, it c-commands a negative polarity item. In the following interrogative example, a positive polarity item occurs, although the sentence is an interrogative.

- (i) Could I have some medicine for cold?

This is due to the fact that the above sentence is used

presupposing the existence of medicine for cold, bearing no uncertainty of truth value.

<sup>3</sup> The empirical fact that *if* occupies the head of MoodP comes from the doubly-filled COMP *if that*, which was broadly observed in Middle English as follows:

- (i) If that thay were put to such assayes The gold of hem hath  
now so badde alayes With bras, that...It wolde rather brest  
in two than plye.

(Geoffrey Chaucer *Clerkes Tale*, 1110, *OED*)

<sup>4</sup> It is not always the case that *if*-clause has a negative meaning.

- (i) If you have some problems, please let me know.

In the above example, *if*-clause is uttered presupposing that there are some problems and thus has no negative meaning. Absence of negative meaning in the *if*-clause induces no license of negative polarity items.

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