Seeds and Functional Projections

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In this article[1] I discuss some theoretical points concerning functional projections in the context of Norwegian and English clause structure. I start with the basic assumption that all trees grow out of a seed, i.e. that all X'-projections must be headed by some substance. Then I propose a seed typology, where the classification is according to the substantial make-up of the seed. The rest of the article is an effort to show that the three possible seed types that are proposed on a priori grounds, namely covert seeds, overt seeds, and dummy seeds, actually exist in natural language.

1. Seeds, substance, and projections

Stowell (1981) proposed that really existing phrase structure rules should be excluded from the syntax. Instead he suggested that phrase structure arises from the morphemes, given some completely general constraint of X'-theory. This proposal has interesting consequences for the functional part of a clause. Applied to functional structure, Stowells proposal could be formulated as in (1):

(1) A functional projection is the projection of a functional seed (at D-structure).

One important consequence of (1) is that there cannot exist functional projections that serve exclusively as empty landing-sites for a head. Consequently, (1) excludes (2), but permits (3). (X and Y in (2) and (3) indicate functional seeds.)

(2) *[...[[ ] [...[[X]... (3) [...[[Y] [...[[X]...

Generating (2) would simply require really existing phrase structure rules, because the leftmost projection is not the projection of any seed. But observe that (2) is in fact an instance of the CP-IP structure proposed in Chomsky (1986). There the C-projection violates (1) because it only exists to serve as a landing-site for verb movement (in main clauses). Any analysis that assumes a functional projection with this role, violates (1) and is at odds with Stowel'ls proposal that really existing phrase structure rules should be excluded from the syntax. Since Stowells proposal

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seems to make very much sense, I will adhere to (1) in the following analysis of Norwegian and English functional structure, which implies abandoning any empty projections from the grammar (see also Åfarli 1991).[2]

What qualifies as a seed for a functional projection? A seed must consist of some substance, of which there are two types: phonetic and semantic. Accordingly, there are four possibilities to consider:

(4) a. [-p,-s]. b. [+p,+s] c. [-p,+s] d. [+p,-s]

(4a) [-p,-s] is just nothing and does of course not make up a seed. (4b) [+p,+s] is a seed that has both form and content, as it were; I call it an overt seed. In an analysis that assumes that the tense affix itself heads a functional projection, that tense affix is a seed of this type. (4c) [-p,+s] is a *covert seed* (or abstract seed); it has only semantic substance. (4d) [+p,-s] is a *dummy seed*; it has only phonetic substance. I shall argue that all three types of possible seed exist in natural language, but first I shall discuss a couple of other questions that are crucial to the analysis of the functional part of a clause.

There is a possibility that the functional structure of clauses is canonically given, such that all languages employ the same set of functional seeds. I find this possibility extremely unlikely and I leave it out of further consideration. The alternative possibility is that the pool of possible functional seeds is universal, but that languages and even different clause types within a language actually employ a subset of seeds from this pool. In that case it is an empirical question whether a given seed is employed in some language or clause type.

The empirical evidence for the number and kinds of functional seeds employed in a clause is possibly quite complex. Here I will briefly discuss two simple criteria that may be relevant:

(5) A clause type exhibits a functional morpheme, only if that clause type employs a corresponding functional seed (& projection).

(6) A clause type exhibits a functional morpheme, if and only if that clause type employs a corresponding functional seed (& projection).

(5) takes the presence of functional morphology as empirical evidence for the existence of a functional seed and projection, but it does not exclude the possibility that there exist functional seeds and projections without any morphological correlate. (6) excludes the latter possibility. (6) thus amounts to a kind of naive recoverability constraint to the effect that every functional seed, and in particular every covert functional seed, must somehow have a morphologically visible effect, i.e. that it must have a morphological correlate (which does not necessarily mean that the seed itself is visible, cf. section 2).

(6) may strike one as too severe, in fact, it seems to impose a strait-jacket reminiscent of behaviourism. However, to the extent that the syntactician is sceptical of nouns, verbs, prepositions, and adjectives that have no morphological correlate,

(2) (1) does not of course exclude head to head movement, because a head could be adjoined to another head or alternatively move to a base-generated slot in another head.

he should also be sceptical of for instance a syntactic tense category that has no morphological correlate. So, for the purpose of this paper, I want to try out the more constrained alternative. Nevertheless, if future research shows that (6) cannot be maintained, the assumption of the weaker criterion (5) would be compatible with the main line of argument of this article.

Assuming that a functional seed is identified, what is its nature? I will claim that a functional seed, if it has semantic content (i.e. if it is not a dummy seed), is an operator that takes the proposition as argument. There are at least three plausible candidates for such functional operators: tense, mood, and aspect. To illustrate, consider tense. In tense logic it is customary to construe tense as an operator with scope over the proposition. This operator takes the proposition as argument and yields a tensed proposition as value:

(7) $T\ [_{prop}\ P(a)]$

The tense operator can be thought of as "directing" the truth conditions of the proposition to a specific point in time. I will assume that the syntactic analysis of tense is analogous: The tense seed is an operator that c-commands the clause:

(8) $[_{TP}$ ...[T $[_{clause}$ NP [V.....

Mood (M) and aspect (A) can be analysed in a similar manner, cf. (9) and (10), where the a-versions are possible logical representations and the b-versions the corresponding syntactic representations:

(9) a. $M\ [_{prop}\ P(a)]$
b. $[_{MP}$ ...[M $[_{clause}$ NP [V.....

(10) a. $A\ [_{prop}\ P(a)]$
b. $[_{AP}$ ...[A $[_{clause}$ NP [V.....

The mood operator in natural language typically expresses the opinion or attitude of the speaker (subjective modality), cf. Palmer (1986: 16). It can be said to take a proposition as argument and yield a proposition with illocutionary force as value, see Stenius (1967) for an analysis exploiting this idea. Aspect relates to ways of "viewing the internal temporal constituency of a situation" (Comrie 1976: 3). Aspect can be inherent to the verb or verb phrase, or it can be imposed by an aspect operator and related to inflectional aspect morphology. In the latter case, the aspect operator takes the proposition as argument and yields as value a proposition that has to be interpreted with a special perspective on its internal temporal constituency.

What is the role of agreement in this picture? Compare agreement (which comprise gender, number and person agreement, or GNP-agreement) on the one hand, and tense, mood, and aspect on the other. Apparently, there is a fundamental semantic difference between the two classes of element. Unlike tense, mood, or aspect, agreement is not plausibly construed as an operator that takes the proposition as argument; rather agreement is a formal syntactic relation between a noun (the agreement controller) and some other constituent, typically a verb or an adjective (the agreement target), cf. Corbett (1991). I assume that this formal relation is the relation of specifier-head agreement. In other words, agreement morphology is non-functional verb morphology; there is no Agr-projection.

This has certain consequences. For example, it is suggestive that a functional

morpheme like tense is always expressed on the highest verb in the clause. Since tense is an operator that originates outside the clause itself, it is expected that it reaches down only to the highest verb. In contrast, agreement is found on other verbs too, as shown in (11) (Norwegian) and (12) (Serbo-Croat).

(11) **Hesten** (m, sg) vart **skoten** (m, sg) (GN-agreement)
'The horse was shot'.

(12) ***Ljubomir*** (m, 3.p, sg) *je* (3.p, sg) *dosao* (m, sg) (PN+GN-agreement)
'Ljubomir has come'.

(13) ...[NP_i [AUX [t_i [V ...

This diversity of agreement configurations can be explained if, as proposed above, agreement is simply specifier-head agreement, because the specifier-head relation is found both in the case of the auxiliary verb and in the case of the main verb, if the subject is raised from the specifier position of the main verb to the specifier position of the auxiliary verb, as indicated in (13).

I conclude that agreement, unlike tense, mood, or aspect, is not related to a functional seed and its projection. See Iatridou (1990) for arguments to the same effect regarding a putative Agr-projection in English and French. Note also that agreement, but not functional morphology proper, is often found inside NPs in many languages, e.g. in Norwegian. This suggests that agreement is a more general phenomenon than is captured by assuming that it results from an Agr-projection in the functional system of the clause.

2. Covert seeds

Consider now functional structure in Norwegian. The only operator-related affix shown on verbs in Norwegian is the tense affix. Thus, by the constraints (1) and (6), Norwegian finite clauses employ only one functional projection, the T-projection. This means that finite clauses have a structure like the one shown in (14), where T c-commands the bare clause, i.e. Vn :

(14) $[_{TP}$ ...[T $[_{V}$n NP [V...

The [Spec,TP] position is the position for moved maximal projections. In main clauses, verb movement to the T-position is forced, producing the V2 effect. For concreteness, I assume that the verb moves into a slot specified by the tense operator, cf. Rizzi and Roberts (1989).

The basic structure shown in (14) provides the structural frame for explaining the main word order possibilities in Norwegian. (15) shows main clauses:

(15) a. Ola likar fisk (verb to T &*Ola* to [spec,TP])
Ola likes fish
b. Fisk likar Ola (verb to T &*fisk* to [spec,TP])
Fish likes Ola
'Fish Ola likes'.
c. Likar Ola fisk (verb to T: y/n question)
Likes Ola fish
'Does Ola like fish?'

d. *Likar fisk Ola (verb to T; no room for obj preceding su)
e. *Ola fisk likar (verb to T; no room for su+obj preceding verb)
f. *Fisk Ola likar (verb to T; no room for obj+su preceding verb)

Provided that the verb must move to T, and provided that movement to [Spec,TP] is optional, the permutation possibilities permitted by (14) are exactly (15abc), which are in fact the grammatical permutations. This indicates that the assumption of one functional projection, which was suggested by the morphological evidence, is sufficient for the analysis of word order in Norwegian.

What is the relation between T and V in a structure like (14)? If the tense operator is the affix itself, the association of affix and verb could take place either by upward verb movement or by downward affix movement. However, I will exclude the latter possibility for principled reasons: The evidence for general downward movement is very poor and such movement should be excluded in a constrained grammar.

However, alleged downward movement can be reconstrued as feature transfer constrained by head government.[3] This is presumably a device that is employed by the syntax anyway, e.g. in Case assignment. Feature transfer is extensively discussed in Borer (1984), who proposes a set of inflectional rules that involve feature transfer. Thus, in (14) T and V could be related in the following way: The tense operator is covert and governs the V-projection down to its head. The appropriate tense feature is then transferred from the operator to the verb by means of an inflectional rule which may be called Tense Assignment. The tense affix is the spell-out on the verb of the assigned tense features. More generally, the syntax allows exactly two ways of associating X and V in (16), where X is a functional operator and where V must bear an affix appropriate to that functional operator:

(16) $[_{XP}$ ...[X $[_{Vn}$ ....[V...

Either V moves to X, or X assigns a feature to V. In the former case X is typically an overt affix; in the latter case it is typically a covert abstract element.

I shall now argue that the verb acquires its tense affix by Tense Assignment rather than verb movement in Norwegian. Recall that (1) together with (6) permit only one functional projection in Norwegian. That being so, the distribution of the sentence adverbial (SA) shows that the complementizer must occupy the slot specified by the tense operator in embedded clauses in Norwegian. The finite verb precedes the SA in the main clause (17a), whereas it is the other way round in (18a), where the complementizer is present. This is taken to indicate that the verb does not move out of VP in embedded clauses. Assuming that the sentence adverbial is adjoined to VP, the grammatical (17a) and (18a) therefore have the analyses shown in (19a) and (19b), respectively.

(17) a. Johan *kjøper* **vanlegvis** fisk.
Johan buys usually fish
b. *Johan **vanlegvis** *kjøper* fisk.

(18) a. ... om Johan **vanlegvis** *kjøper* fisk.
... if Johan usually buys fish
b. *... om Johan *kjøper vanlegvis* fisk.

(3) Informal definition of head government: A head only governs its sister maximal projection, any category adjoined to that maximal projection, and the specifier and the head of that maximal projection.

(19) a. $[_{TP}$ Johan$_i$ $[$ *kjøper*$_j$-T $[_{VP}$n t $_i$ $[_{VP}$ **vanlegvis** $[_{VP}$ t $_j$ fisk
b. $[_{TP}$ $[$ om-T $[_{VP}$n Johan $[_{VP}$ **vanlegvis** $[_{VP}$ *kjøper* fisk

In (19b) the presence of the complementizer in T blocks verb movement. Therefore, it is impossible for a putative tense affix in T and the verb to be merged by means of verb movement. Tense Assignment is the only possibility left (provided, as before, that downwards affix movement is excluded).

There is also evidence that Tense Assignment is the appropriate notion for main clauses, in spite of the fact that the verb moves to T there. Consider so-called VP-topicalization as exemplified in (20):

(20) [Kjøpte fisk]$_i$ gjorde Johan t$_i$
bought fish did Johan

Here the proverb *gjere* 'do' must be inserted. Surprisingly, both the main verb and the proverb may bear a tense affix: *-te* and *-de*, respectively. On the assumption that a tense affix must head a functional projection, (20) exhibits two T-projections, a most unlikely situation. However, (20) is compatible with there being one T-projection, if Tense Assignment is a possibility. For example, if the T-projection is headed by an abstract tense operator, tense features might be assigned, first to the stem *kjøp-* before VP-topicalization, then to the stem *gjer-*, the assumption being that a tense feature is assigned to any verb that happens to be in the government domain of the tense operator.

I conclude that Tense Assignment takes place in both main clauses and embedded clauses in Norwegian. Thus, the acquisition of tense by the verb is not related to verb movement, although verb movement takes place for independent reasons to yield the V2 effect in main clauses. This analysis shows that the T-projection is headed by a covert seed in Norwegian.

Now consider English. If agreement does not involve a functional projection (recall section 1), the morphological facts suggest that English only has a tense projection beside the bare clause. In other words, the basic structure for English and Norwegian is the same, namely (14). Also, word order facts suggest that sentence adverbials normally adjoin to the VP in English, as they do in Norwegian:

(21) ...if John **usually** *buys* fish. (22) ...om Johan **vanlegvis** *kjøper* fisk.

However, unlike Norwegian, English shows the same word order in main and embedded clauses:

(23) a. John **usually** *buys* fish.
b. *John *buys* **usually** fish.

(24) a. *Johan **vanlegvis** *kjøper* fisk.
b. Johan *kjøper* **vanlegvis** fisk.

Since the order in (24b) results from verb movement of the main verb together with raising of the subject, the order in (23a) indicates that no movement of the main verb takes place in English. (For the purpose of this paper I consider this a primitive property of English, but see Pollock 1989 for a possible explanation). It is therefore impossible for the verb to get tense by verb movement both in main and embedded clauses in English. I conclude that Tense Assignment must take place in

both clause types. This suggests that the T-projection is headed by a covert seed in English too.

3. Overt seeds

The analysis in section 2 established that tense is a covert seed both in Norwegian and English. Generalizing the analysis, it is of course possible that also mood and aspect are covert seeds in languages that show mood and aspect affixes. Moreover, clauses might employ several covert functional operators, as e.g. in (25), where X, Y, and Z may be identified as tense, mood, and aspect, respectively:

(25) $[_{XP} ...[X [_{YP} ...[Y [_{ZP} ...[Z [_{V_n} NP [V .....$

Given such a situation, X, Y, and Z features are assigned to the verb, by the verb moving head to head into the appropriate assignment domains, i.e. into the government domain of the assigner. The appropriate features are spelled out as X, Y, and Z affixes on the verb.

However, the seed typology also opens the possibility that X, Y, and Z in (25) are overt seeds. In fact, that seems to be the case in Creole languages, which typically show a system of tense, mood, and/or aspect particles, see Muysken (1981).[4] (26) shows a relevant example (from Seychellois), and the table in (27) shows the remarkably regular TMA particle system in a sample of Creole languages (all data are from Muyskens article):

(26) mõ *pu* vin ris e zur
I MOOD become rich one day
'I may become rich one day'.

(27)

	Tense	*Mood*	*Aspect*
Hong Kong Macanese	ja	logo	ta
Haitian	te	ava	apé
Jamaican	ben	wi	a/da
Negerhollands	ha	lo	le

I propose that these TMA particles are the overt seed counterparts to the covert TMA seeds found in other languages. In other words, we are here faced with instances of overt functional seeds. Taking (25) to represent the functional TMA structure of a clause, it can be concluded that languages (or clause types) may vary as to the nature of the functional seeds as covert or overt, as well as to the number and kind of functional projections actually employed.

What happens if the two types of functional operator, the covert type and the overt type, are mixed? Consider for instance the following hypothetical case, where a is a covert tense operator and *aba* is a made-up overt free form mood operator:

(28) $[_{TP} ...[\alpha [_{MP} ...[aba [_{V_n} NP [V .....$

Here the verb is prohibited from moving into the government domain of α, on the assumption that *aba* already fills the appropriate position. Therefore, tense

(4) I do not here consider the possibility that there also exist languages where tense, mood, and/or aspect affixes must be analysed as overt functional seeds.

cannot be assigned to the verb. However, the overt free form mood operator is in the government domain of α. If we assume that tense can in fact be assigned to the overt mood operator, we get an overt mood operator with a tense affix. In other words, we get what is usually called a modal auxiliary verb.

If there is a free form aspectul operator *bab* in this configuration, the situation is analogous, and we get what is called an aspectual auxiliary verb:

(29) $[_{TP}$ ...[α $[_{AspP}$ ...[bab $[_{Vn}$ NP [V ...

In other words, modal and aspectual auxiliary verbs are possibly functional operators that head their own projections. I will assume that this is not only a possibility, but that it is actually the case (see also Ouhalla 1990 for a similar position). Thus, auxiliary verbs are also overt functional seeds. Given this situation, it is perhaps suggestive that we find modal and aspectual auxiliary verbs in languages like Norwegian or English, i.e. languages that lack mood and aspect affixes on verbs.

If this analysis of auxiliary verbs as mood or aspect operators is correct, an auxiliary verb, like other functional operators, c-commands the clause. This is shown in (30).[5] I assume that auxiliary verbs do not assign Case, so that the Case Filter triggers obligatory raising of the subject past the auxiliary verb as indicated in (31) in the case of an embedded clause (co=complementizer). (I use the label AUX here and throughout the rest of this article, although it is possible that the appropriate label should really be M(ood) or A(spect), depending on the nature of the auxiliary).

(30) $[_{TP}$ ...[T [...[AUX $[_{Vn}$ NP [V ...

(31) ...$[_{TP}$ [co-T [NP_i [AUX $[_{Vn}$ t_i [V ...

Now, to carry the analysis a step further, consider the well-known fact that auxiliary verbs demand that the following verb occurs in a certain form. (32) and (33) illustrate the point. In (32) the modal auxiliary demands that the main verb is in the infinitival form, whereas the aspectual auxiliary in (33) dictates that the main verb is in the past participle form.

(32) ...at Ola kan *kjøp*e fisk
'...that Ola can buy fish'.

(33) ...at Ola har *kjøp*t fisk
'...that Ola has bought fish'.

(34) $[_{TP}$ [at-T [Ola_i [AUX $[_{Vn}$ t i [kjøpe/kjøpt ...

If the auxiliary verb is a functional seed that governs the main verb, as shown in (34), these facts may be explained as feature transfer, where modal auxiliaries assign the feature infinitive to a verb in its government domain and aspectual auxiliaries similarly assign the feature past participle. The relevant features are spelled out as affixes.[6]

(5) Notice that the order of functional projections is such that the covert tense seed c-commands the overt auxiliary verb seed. This is necessary if tense is to be assigned to the overt seed. Laka (1990) independently argues that tense is the highest functional projection. This is comparible with the observation made in Muysken (1981) that the normal order of functional particles in Creole languages is tense, mood, and aspect.

(6) Notice that the government restriction on feature transfer excludes clauses like (i) and (ii) where feature transfer illegitimately has taken place over an intervening functional projection.

This analysis is analogous to the analysis of Tense Assignment. In fact, the two analyses really constitute a unified analysis, relying on the notion of feature transfer constrained by government. This is much in the spirit of the Standard Theory analysis, which also proposed a unified analysis of this type of data, relying on the notion of Affix Hopping.

Unfortunately, English auxiliary verbs are a bit harder. (35) and (36) seem to present simple cases of feature transfer, as in the corresponding cases in Norwegian. However, it has been argued (originally by Pollock 1989) that the negation element *not*, unlike (other) sentence adverbials and unlike the Norwegian negation element, heads a functional projection in English, which is an assumption that I adopt (cf. section 4). But this assumption creates problems for the analysis of clauses like (37) and (38):

(35) ...that John **can** *buy* fish.

(36) ...that John **has** *bought* fish.

(37) ...that John **cannot** *buy* fish.

(38) ...that John **has not** *bought* fish.

In (37) and (38) the auxiliary verbs, being functional operators, seem to be generated to the left of the NegP headed by *not*. However, if that were the case, the presence of NegP would block the context restriction imposed by the auxiliary verbs, just as NegP blocks Tense Assignment in a sentence like (39):

(39) *...that John **not** buys fish.

Can this problem be solved? Consider first aspectual auxiliaries as in (38). The problem would be solved if the perfective auxiliary is base-generated to the right of the negation element and subsequently raised to the left of it. There is in fact some evidence that this is the case. If a clause contains both a modal and a perfective auxiliary, the perfective auxiliary is to the right of the negation element:

(40) ...that John **may not have** bought fish.

On the basis of this evidence I assume that perfective auxiliaries in English are base-generated to the right of NEG. Thus, (38) has the underlying structure shown in (41):

(41) ...that-T NP **not have** bought NP

In (41) the main verb must surface in its past participle form, because of the context requirement set by the perfective auxiliary which governs it. But Tense Assignment is blocked by the negation element. Apparently the perfective auxiliary must raise to the left of NEG, as shown by the grammatical word order in (38). Is such raising permitted by general principles of syntax?

Assume first that the auxiliary raises to produce the following structure, where the auxiliary is now in the government domain of T such that Tense Assignment can take place, as required:

(i) *...at Ola skal ha kjøpe fisk.
'...that Ola shall have buy fish'.

(ii) *...at Ola ha åt fisk.
'...that Ola have ate fish'.

(42) ...that-T NP AUX$_i$ not t_i bought NP

However, (42) violates Relativized Minimality as originally formulated in Rizzi (1990) (because not intervenes between AUX and its trace), and even though one could interpret Relativized Minimality such that the auxiliary and the negation are not counted as governors of the same kind, so that (42) would not constitute a violation, (42) still poses a problem for the following reason: Since the auxiliary is an operator (and therefore has semantic content), the movement in (42) would either violate the Projection Principle or else require a pre-created landing-site, violating the prohibition against empty base-generated projections discussed in section 1.

There is, however, another possibility. Assume that the auxiliary incorporates into the negation element to create the complex head [$_{Neg}$ *aux* not] shown in (43) (the negation element must be assumed to be unique among overt free form seeds in allowing such incorporation):

(43) T [$_{NegP}$ NP [$_{Neg}$ *aux* not] *t* bought NP

In fact, there is independent evidence that the auxiliary incorporates with the negation element. Inversion is movement to **T**, as shown in (44). If aux plus negation form one head, it is expected that that head inverts, which is in fact the case, as shown in (45) (only the trace of the complex head is indicated):

(44) **Has**-T John t bought fish (45) **Hasn't**-T John t bought fish

Conversely, if it is not assumed that AUX plus negation form one head, it is difficult to explain (45).[7]

Consider now modals, as in (37), repeated here as (46). From (47) one can conclude that the modal and the negation element constitute one complex head, just as in the case of aspectual auxiliaries.

(46) ...that John **cannot** *buy* fish. (47) **Cannot**-T John t buy fish

However, unlike what is the case for aspectual auxiliaries, it is possible to assume that modals are directly inserted into the negation element. The reason for this is that English infinitives never show an infinitival affix, the infinitival form of the verb being identical to the stem. Thus, one could suppose that the main verb in (46) and (47) is not subject to any context requirement, and that it therefore shows up in its default form. In other words, one need not assume that the modal is ever situated in a position where it governs the main verb. On the other hand, it would also be possible to analyse modals on a par with aspectual auxiliaries, as raised elements. For lack of evidence that favours one of the solutions over the other, I will leave the matter undecided.

(7) Notice that (i) is also grammatical, although slightly more marked than (45):

(i) Has John not bought fish?

Here the auxiliary verb first incorporates with the negation element and is then assigned tense by Tense Assignment. Then it excorporates from the aux+negation complex and moves to T. I cannot go into this process for lack of space, but the reader is referred to Roberts (1991) and Guasti (1991) for possible analyses of and constraints on excorporation. For cases of verb incorporation into negation in other languages, see Rivero (1991).

4. Dummy seeds

The last task is to show that natural language also employ dummy seeds. First, consider *do*-support. As is well known, the negation element *not* triggers *do*-support in English, unlike (other) sentence adverbials. (48), (49), and (50) show relevant data:

(48) John never *buys* fish. / ...that John never *buys* fish.

(49) *John not *buys* fish. / *...that John not *buys* fish.

(50) John does not *buy* fish. / ...that John does not *buy* fish.

(48) is grammatical because a sentence adverbial like never is adjoined to the VP. Therefore its presence does not block Tense Assignment. On the other hand, (49) is ungrammatical because English *not* is a non-typical sentence adverbial by being the head of a NegP in the functional system of the clause. Thus, the negation element excludes the main verb from the government domain of T and Tense Assignment is therefore blocked. Also, main verbs, unlike auxiliary verbs, do not move in English, so that the main verb cannot incorporate into the negation element.

However, English allows the insertion of a truly auxiliary verb into the government domain of T, so that the tense feature can be assigned after all. This is the so-called *do*-support. I will claim that the *do* of do-support is a functional seed of the dummy seed type, i.e. [+p,-s]. As for context requirements, *do* behaves like modals, i.e. it can be considered as setting no context requirements (which is just what one would expect from a dummy seed). Thus, like modals, *do* may be assumed to be inserted directly into the negation element.

In fact, there is some reason to believe that even the copula is a dummy functional seed that is inserted to provide a verb for Tense Assignment. Consider the Norwegian complement clauses shown in (51)-(53):

(51) Vi ser [Johan sint].
We see Johan angry

(52) *Vi ser at [Johan sint].
We see that Johan angry

(53) Vi ser at Johan er sint.
We see that Johan is angry

The small clause in (51) does not have a T-projection and it therefore does not require a verb for the purpose of Tense Assignment. In (52) and (53) the presence of the complementizer shows that the complement clause has a T-projection. However, here the presence of a verb for the purpose of Tense Assignment is forced, as shown by the ungrammaticality of (52). Since there is no verb in the predicational part of the clause, a dummy verb is inserted, namely the copula. The analysis of the embedded clause in (53) is shown in (54):

(54) at-T [$_{V}$n Johan $_{i}$ [er [$_{A}$n t$_{i}$ [sint

Note that the insertion of the copula does not violate the Projection Principle since the copula is a dummy seed.

I conclude that *do*-support and probably "copula-support" provide a dummy verb

for the purpose of Tense Assignment, and that both *do* of *do*-support and the copula are properly regarded as dummy seeds. This exemplifies the third and last type of possible functional seeds.

5. Conclusion

The argument of this article started from the assumption that an X'-projection must be the projection of a seed. Concentrating on functional projections, I argued that there are exactly three possible classes of seed: covert seeds, overt seeds, and dummy seeds. My main aim was then to produce evidence that natural language in fact exhibit functional seeds belonging to each class. Thus, I have argued that tense is a covert seed in Norwegian and English; that tense, mood, and aspect particles in Creole languages, as well as modal and aspectual auxiliary verbs in Norwegian and English, are overt functional seeds; and that the *do* of English *do*-support, and probably the copula, are dummy seeds.

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