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Local Modelling of Non-Local Dependencies in Syntax: An Introduction*

Abstract

This introduction first presents various types of non-local dependencies in syntax (among them instances of movement, reflexivization, case assignment, agreement, consecutio temporum, deletion, switch reference, extended scope of negation, and (semantic) binding). In the second part, we identify three classes of approaches to non-local dependencies: (i) spurious non-locality, (ii) non-local modelling, and (iii) local modelling. Finally, we mention some of the core issues that arise under a local modelling perspective.

1. Non-local dependencies: setting the stage

1.1. Local vs. non-local dependencies

Many syntactic dependencies are strictly local. Often they involve the most local structural relation that is available, viz., sisterhood in phrase structures. This holds, e.g., for the assignment of lexical (or inherent) case, which can generally only affect the lowest argument of a verb – i.e., the sister of V (see Fanselow (2001)). Relevant cases are illustrated in (1): The assignment of inherent genitive to a nominal argument DP by a simple transitive verb in (1-a), and by a ditransitive verb in (1-b), takes place under sisterhood in German. This view is supported by constituency tests: Strict locality is indicated by joint VP topicalization of DP_{gen} and V (with the option of leaving other – higher – arguments in situ) in (1-cd).

- (1) a. dass man der Opfer gedenken sollte
 that one.NOM the victims.GEN commemorate should

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- b. dass die Staatsanwaltschaft die Lehrer der Bestechlichkeit
 that the prosecution.NOM the teachers.ACC the corruptibility.GEN
 überführt hat
 found guilty of has
- c. Der Opfer gedenken sollte man schon
 the victims.GEN commemorate should one.NOM PRT
- d. Der Bestechlichkeit überführt hat die Staatsanwaltschaft die
 the corruptibility.GEN found guilty of has the prosecution.NOM the
 Lehrer
 teachers.ACC

In other cases, the dependency may range beyond strict sisterhood but can still be covered by relying on a notion like that of (the minimal) *predicate/argument structure* (i.e., a predicate together with all its arguments as they are required by its subcategorization frame – itself a syntactic dependency that is very local), or by invoking the *clause-mate relation*. Thus, the dependency formed by combining a reflexive with its antecedent (‘reflexivization’) is typically confined to a single predicate/argument structure, in the sense that it affects co-arguments. See (2-ab) (where co-occurrence in a reflexivization dependency is indicated by co-indexing), and Pollard & Sag (1992), Reinhart & Reuland (1993), and Buring (2005) for approaches to reflexivization that more or less directly incorporate this argument structure-based concept of locality.

- (2) a. John₁ likes himself₁
 b. *John₁ thinks that Mary likes himself₁

In many (but certainly not all) languages, the scrambling operation (cf. Ross (1967)) producing variable (or free) word order is also a highly local process, and similar considerations hold for movement to subject position (or raising to subject) in languages that exhibit a requirement to fill this position (the ‘EPP’ property; see Chomsky (1982)). Thus, scrambling in German and raising to subject in English are both dependencies that cannot span a (finite) clause; the dependencies, conceived of as movement, require the base position and the target position to be clause-mates. Local dependencies are shown for scrambling in German in (3), and for raising in English in (4), with t_1 representing the trace left in the base position of the moved item.

- (3) a. dass den Fritz₁ keiner t_1 gesehen hat
 that the Fritz.ACC no-one.NOM seen has
- b. dass darüber₁ keiner [_{DP} ein Buch t_1] gelesen hat
 that about this no-one.NOM a book.ACC read has
- (4) a. A book₁ was given t_1 to Mary
 b. Mary₁ was talked [_{PP} about t_1]

Note that (4-b), and in particular (3-b), call into question the adequacy of the minimal predicate/argument structure as the local domain relevant for these movement types; the PP *darüber* ('about this') in (3-b) is not an argument of the verb *sehen* ('see'). However, the movement operations are still highly local. As shown by the ill-formed examples in (5) (instantiating long-distance scrambling in German and long-distance raising to subject in English, respectively), they are confined by a clause-mateness requirement (where "CP" stands for a clause).

- (5) a. *dass wir den Fritz₁ glauben [CP dass keiner t₁ sah]
 that we.NOM the Fritz.ACC believe that no-one.NOM saw
 b. *John₁ seems [CP that t₁ gave a book to Mary]

However, even though many core dependencies in syntax are local, syntactic dependencies may also be *non-local*, in the sense that they involve two positions in a phrase structure whose correspondence cannot be captured by invoking concepts like sisterhood, (minimal) predicate/argument structure or the clause-mate relation.

First and foremost among these potentially non-local dependencies are various types of *movement* (or *displacement*) in the world's languages. In addition (and in contrast to what we have seen above), some kinds of *reflexivization* may be non-local: Reflexivization is often confined to minimal predicate/argument structures, but may also apply long-distance in certain contexts in certain languages (without necessarily being amenable to an account in terms of logophoricity, see below). Similarly, it looks as though certain kinds of *non-local case assignment* (which are not necessarily confined to minimal predicate/argument structures) can also occur. Indeed, it turns out that there are non-local instances of many other dependencies (that may often be classifiable as local in their core occurrences), among them *long-distance agreement* (in languages like Tsez, Itelmen, Hindi, perhaps also Icelandic), *consecutio temporum* (which involves a non-local relationship between an embedded tense and a matrix tense), *extended scope of negation*, *extended mood selection* (cf., e.g., the relation between a matrix predicate like *demand* and an embedded mood marking as subjunctive), *control* of the subject of an infinitive by an argument belonging to a matrix clause, the related phenomenon of *switch reference* systems indicating identity of reference or disjointness of matrix and embedded subjects, and last but certainly not least the (semantic) *binding of variables* (as, e.g., in the case of bound-variable pronouns), which is potentially non-local almost by definition.¹ Let us go through some relevant examples.

¹ In order to show that these dependencies are indeed instances of *non-local*, or *long-distance*, dependencies, it must of course be established in each case (a) that there is a clause boundary (in a relevant, technical sense, e.g., as a CP phrase headed by C, or as an S' node in earlier work), or

1.2. Long-distance movement

The most well-known and best established cases of non-local dependencies are displacement constructions like *wh*-movement, topicalization, relativization, etc., where the moved item and its base position can in principle be separated by arbitrarily many intervening clause boundaries. Examples from English are given in (6-a) (*wh*-movement), (6-b) (topicalization, from Ross (1967)), and (6-c) (relativization, from Gazdar et al. (1985)).

- (6) a. What_{t₁} do you think [_{CP} that John believes [_{CP} that Mary bought t₁]]?
 b. Beans_{t₁} I don't think [_{CP} you'll be able to convince me [_{CP} Harry has ever tasted t₁ in his life]]
 c. The man [_{CP} who_{t₁} I think [_{CP} t₁ chased Fido]] returned

The relation between the position in which the argument status of the displaced item is assessed, or its θ -role is assigned (here indicated by a trace t₁, but at this point this should not be taken to imply any theoretical analysis), and the position that it eventually shows up in can span arbitrarily many CPs (clauses), provided that no constraints on movement (like Ross's (1967) island constraints, Chomsky's (1973) Subjacency Condition, Rizzi's (1990) Relativized Minimality condition, etc.) are violated.

What is more, displacement operations like scrambling and raising to subject position, which as we have seen are strictly local in languages like German and English (respectively), can in fact apply non-locally in other languages. Thus, *long-distance scrambling* from CP is an option in languages like Russian (see, e.g., Müller & Sternefeld (1993) and Bailyn (2001)) and Japanese (see Saito (1985) and Grewendorf & Sabel (1999), among many others; Korean and Persian also belong in this group). The following example taken from Zemskaja (1973) instantiates a well-formed case of long-distance scrambling in (colloquial) Russian.

- (7) Ty [_{DP} doktor]_{t₁} videl [_{CP} kogda t₁ pod''ezžal] ?
 you doctor.NOM saw when came

Similarly, raising to subject position across an intervening CP boundary seems to be available in a number of languages, among them Greek (see Perlmutter & Soames (1979, ch. 43) and Alexiadou & Anagnostopoulou (1999; 2002), among others) and Kilega and other Bantu languages (see Obata & Epstein (2011) and references cited there). A Greek example that illustrates such a legitimate case of *super-raising* is given in (8):

some other independently established locality domain, separating the two items participating in the dependencies, and (b) that the clause boundary (in this technical sense; or some other locality domain) blocks the local relationship. Otherwise, one could argue that, e.g., a C projection is a mere theoretical construct or artefact. We will return to this issue below.

- (8) [_{DP} I kopeles]₁ fenonde [_{CP} na t₁ fevgun]
 the girls.NOM seem-3.PL SUBJ leave-3.PL

1.3. Long-distance reflexivization

Whereas many instances of reflexivization are clause-bound, and often confined to minimal predicate/argument structures, in some contexts, in some languages, long-distance reflexivization is possible. Some classical examples are given in (9), with (9-a) from Latin (see Kuno (1987), Büring (2005)), (9-b) from Icelandic (see Anderson (1983), Koster (1987), Fischer (2004), Büring (2005), and references cited in the latter two works), (9-c) from Chinese, and (9-d) from Korean (both taken from Cole et al. (1990)).

- (9) a. Iccius₁ nūntium mittit [_{CP} nisi subsium sibi₁
 Iccius.NOM message.ACC sends unless relief.NOM REFL
 submittātūr]
 is furnished
 ‘Iccius sends a message that unless relief be given to him (Iccius), ...’
- b. (i) Hann₁ sagði [_{CP} að sig₁ vantaði hæfileika]
 he said that REFL lacked ability
 ‘He said that he lacked ability.’
- (ii) Jón₁ segir [_{CP} að Pétur raki sig₁ á hverjum degi]
 John says that Peter shaves.SUBJ REFL on every day
 ‘John says that Peter shaves him (John) every day.’
- (iii) Jón₁ segir [_{CP} að María viti [_{CP} að Harladur
 John says that Mary knows.SUBJ that Harold
 vilji [_{CP} að Bill meiði sig₁]]
 wants.SUBJ that Bill hurts.SUBJ refl
 ‘John says that Mary knows that Harold wants Bill to hurt him (John).’
- c. Zhangsan₁ renwei [_{CP} Lisi₂ zhidao [_{CP} Wangwu₃ xihuan ziji_{1/2/3}]]
 Zhansan thinks Lisi knows Wangwu lik REFL
 ‘Zhangsan thinks that Lisi knows that Wangwu likes him/self.’
- d. Chelswu-nun₁ [_{CP} Inho-ka caki-casin₁-ul sarangha-nta-ko]
 Chelswu.TOP Inho.NOM he-REFL-acc love-PRES-DECL-C
 sanygakakha-n-ta
 think-PRES-DECL
 ‘Chelswu thinks that Inho likes him (Chelswu).’

In all the cases in (9), a reflexive pronoun (that must be bound by some antecedent) is (or at least can be) bound from outside of the minimal CP that it shows up in (typically by a subject).

1.4. Long-distance case assignment

A first potentially relevant instance of non-local case assignment involves *exceptional case marking* (ECM) constructions, where an embedded infinitival subject receives case from the matrix verb, as in (10) in German.

- (10) Maria₁ lässt [_{α} Fritz das Geschirr waschen]
 Maria.NOM lets Fritz.ACC the dishes.ACC wash

However, it is not quite clear that cases like (10) do indeed instantiate non-local case assignment. First, it has often been argued that α does not qualify as a clause boundary (so that case assignment in (10) would still comply with a clause-mate requirement); second, it has sometimes been argued that the embedded subject has in fact undergone raising to the object position of the matrix clause, in which case the dependency would clearly be local; and third, it might be that α does not exist in the first place, with the two predicates (*lassen* ‘let’ and *waschen* ‘wash’ in (10)) having been combined into a simple complex predicate, which would also get rid of any potential deviation from strict locality. The second option (i.e., movement of the case assignee to the matrix object position) has also often been pursued for apparent cases of exceptional case marking into *finite* clauses (see Massam (1985) for general issues, and, e.g., Chung (1976) on Indonesian, Alboiu & Hill (2011) on Romanian, Seiter (1983) on Niuean, and Kotzoglou (2002) on Greek).

Still, it seems that there are some unequivocal cases of non-local case assignment. A particularly striking example is the phenomenon of accusative case assignment by a matrix verb to the internal DP argument of an embedded verb in the Kansai variety of Japanese, as it has been investigated by Ura (2007). In (11-a), the embedded predicate cannot assign accusative case, but the embedded object bears accusative. Illformedness results when the matrix predicate cannot assign accusative case (due to passivization), as illustrated in (11-b). This provides a good argument for accusative case assignment by the matrix predicate to the embedded object DP in (11-a).

- (11) a. Boku-wa [_{CP} John-ni sono *koto-o* deki-soo-ya (te)]
 I-TOP John-DAT the task-ACC able-likely-be(PRES) COMP
omow-u
 think-PRES
 ‘I think that John is likely to be able to do the task.’
- b. *[_{CP} John-ni sono *koto-o* deki-soo-ya (te)]
 John-DAT the task-ACC able-likely-be(PRES) COMP
omow-are-te ru
 think-PASS-PROG PRES
 ‘It is believed that John is likely to be able to do the task.’

Another relevant example involves long-distance assignment of accusative case in Finnish, as it has been described by Vainikka & Brattico (2011). Finnish has four different morphological exponents for structural object case that can be viewed as accusative allomorphs (with the choice basically governed by the well-established principles of differential object marking in simple contexts, see Aissen (2003) and Keine & Müller (2008)). Interestingly, with a particular class of infinitival complements, the choice of accusative marker depends on whether ϕ -agreement takes place with the nominative subject in the matrix clause. If so, the case allomorph *n* shows up on the embedded object; if no ϕ -agreement takes place in the matrix clause (or if the infinitive is not c-commanded by a matrix verb in the first place), the zero accusative allomorph is chosen. This is illustrated by the examples in (12).

- (12) a. Yritimme [CP löytää sisko-n/*- \emptyset pihalta]
 try.PAST/1PL find.A sister-ACC(n)/ACC(\emptyset) yard-ABL
 ‘We tried to find the sister in the backyard.’
 b. Yritä [CP löyää sisko- \emptyset /*-n pihalta]!
 try.IMP find.A sister-ACC(\emptyset)/ACC(n) yard.ABL
 ‘Try to find the sister in the backyard!’

A third relevant phenomenon that shows up in argument encoding systems with argument type-based splits is what Silverstein (1976) aptly called *global case marking* (as opposed to standard instances of *local case marking*, with the terminology – local vs. global – taken from Chomsky (1965)). For instance, in Yurok (see Robins (1958)), accusative case is realized on the internal argument of a predicate only if the external argument is lower on the referential hierarchy (here governed by person choice) than the internal argument; see (13-a) (no accusative marking on the object because both argument DPs are local – 1. or 2. – person) vs. (13-b) (accusative marking on the object because the internal argument DP is 1. person and the external argument DP is 3. person).

- (13) a. Keʔl nek ki newoh-paʔ
 2SG.NOM 1SG.NOM FUT see-2>1SG
 ‘You will see me.’
 b. Yoʔ nek-ac ki newoh-peʔn
 3SG.NOM 1SG-ACC FUT see-3SG>1SG
 ‘He will see me.’

Accusative case assignment in (13-b) does not cross a clause boundary; still, it is non-local in the sense that, in contrast to standard instances of accusative assignment, information available within the VP that contains the case-assigning verb and the object does not suffice to determine whether case is actually assigned; in order to decide this, properties of the VP-external subject argument also have to be taken into consideration.

1.5. Long-distance agreement

Typically, agreement is a clause-bound dependency: Abstracting away from DP-internal concord (see Alexiadou et al. (2007)), feature sharing involved in binding (see below) and various other, more marginal, phenomena (such as agreement spreading in Archi, see Chumakina & Corbett (2008)), the core cases of agreement are such that a predicate agrees with some DP(s) with respect to ϕ -features like person, number, and gender. Usually, the agreement controller is an argument of the target predicate, but in some cases, a minimal extension of the local domain for agreement beyond the minimal predicate/argument structure may be necessary, as, e.g., with agreement in possessor raising constructions; an example from Mohawk is given in (14) (see Baker (1988)). Here, the predicate agrees with the possessor ('John') of the incorporated N ('house'), as evidenced by the marker *hrao* (3M); agreement with an unincorporated N *nuhs* would have triggered the marker *ka* (3N) instead.

- (14) *Hrao-nuhs-rakv ne sawatis*
 3M-house-white John
 'John's house is white.'

However, notwithstanding the question of whether this analysis in terms of genuine possessor raising can be maintained after all (see Baker (1996) for qualifications), it is clear that the agreement here would still qualify as fairly local – it would still be a clause-bound process.

The case is different with another class of non-local agreement phenomena which have figured prominently in the more recent literature. In cases of so-called *long-distance agreement* (LDA), a *matrix* verb agrees with the argument of an *embedded* clause with respect to ϕ -features. Some relevant examples are given in (15), from Hindi (in (15-a)), Kashmiri ((15-b); both examples are taken from Bhatt (2005)), Tsez ((15-c), from Polinsky & Potsdam (2001)), Kutchi Gujarati ((15-d), from Grosz & Patel (2006)), Khwarshi ((15-e), from Khalilova (2007)), and Chukchee ((15-f), from Bošković (2007)).

- (15) a. Vivek-ne [_{CP} kitaab paṛh-nii] chaah-ii]
 Vivek-ERG book.F read-INF.F want-PFV.F.SG
 'Vivek wanted to read the book.'
- b. Raam-an che hameeSI yatshImatsI [_{CP} panInis necivis
 Ram-ERG be.PRS.F always wanted.F.PL self.DAT son.DAT
 khAAtrl koori vuchini]
 for girls see-INF.F.PL
 'Ram has always wanted to see girls for his son.'

- c. Eni-r [CP u \check{z} - \bar{a} Magalu b- $\bar{a}c'$ -ru-hi]
 mother-DAT boy-ERG bread.III.ABS III-eat-PSTPRT-NMLZ
 b-iy-xo
III-know-PRS
 ‘The mother knows the boy ate the bread.’
- d. Valji-ne [CP chopri vanch-vi] par-i
 Valji.M-DAT book.F read-INF.F have.to-PFV.F
 ‘Valji had to read the book.’
- e. I $\check{s}et'u$ -l y-iq'- $\check{s}e$ [CP goli u $\check{z}a$ bataxu
 mother/OBL-LAT G5-know-PRS COP boy/ERG bread(G5)
 y-acc-u]
G5-eat-PTCP:PST
 ‘Mother knows that the boy ate bread.’
- f. $\text{\textcircled{a}nan}$ q $\text{\textcircled{a}lyilu}$ l $\text{\textcircled{a}nj\text{\textcircled{r}k\text{\textcircled{a}}}$ -nin-et [CP $\text{\textcircled{i}nqun}$ $\text{\textcircled{0-r\text{\textcircled{a}t\text{\textcircled{a}m'}}$ \text{\textcircled{n}\text{\textcircled{e}n-at}}
 he-INST regrets-3-PL that 3SG-lost-3-PL
 q $\text{\textcircled{a}ra-t}$]
 reindeer.PL.NOM
 ‘He regrets that he lost the reindeers.’

As indicated by underlining in the glosses, in all the LDA cases in (15), the matrix predicate agrees with respect to ϕ -features (person, number, and gender – note that in the Nagh-Daghestanian examples in (15-c) and (15-e), the numbers signal genders rather than inflection classes). An interesting additional observation is that in all these cases, the embedded V also has to agree with whatever the matrix V agrees with.

1.6. Other phenomena

Sequence of tense restrictions are also prototypical cases of a non-local dependency: Here the interpretation of an embedded tense depends on the tense specification of the matrix clause (in addition to other properties of the embedded clause, like aspect). Consider the following data from Korean and English (taken from Kang (1996)).

- (16) a. Yuna-n $\check{u}n$ [CP Minsu-ka ap-ass-ta-ko]
 Yuna-TOP Minsu-NOM be.sick-PAST-DECL-COMP
 malh $\text{\textcircled{a}}$ -ss-ta
 say-PAST-DECL
- b. Mary said [CP that John was sick]

The Korean example in (16-a) can only have the (expected) reading where Minsu’s being sick *precedes* Yuna’s saying so, i.e., both PAST exponents are interpreted regularly. In contrast, the English example in (16-b) can be under-

stood in such a way that the time of John's being sick and the time of Mary's utterance are identical. In this reading, the embedded tense information must be ignored. Various proposals have been advanced to account for *consecutio temporum* effects like the one at hand (see, e.g., Ogihara (1989), Stechow (1995; 2003), Kratzer (1998)), but all existing analyses converge on treating the effect as a non-local phenomenon (e.g., by postulating an appropriate non-local tense-deletion rule, or by postulating a special type of non-local binding).

Next, *VP ellipsis*, conceived of as PF deletion of a VP (see Merchant (2001)), may need to be viewed as non-local in certain contexts. As argued by Aelbrecht (2010) (though see Bošković (2012) for a different approach), examples such as (17-a) in English must be analyzed in such a way that the lexical item licensing the deletion is *not* the locally embedding non-finite auxiliary (here: *been*), but the non-local finite head higher up in the structure (here: *should*); the argument is based on the premise that if the local non-finite verb could license ellipsis, (17-b) should also be possible, which it is not.

- (17) a. I hadn't been thinking about that. Well, you should have been ~~thinking about that~~
 b. *I hadn't been thinking about it, but I recall Morgan having been ~~thinking about it~~

Another phenomenon whose non-locality may be initially unexpected concerns the *scope of sentential negation*. Typically, the scope of sentential negation is restricted to the minimal clause that it occurs in. Some initial doubt may be shed on the correctness of this generalization in the case of infinitival constructions such as the one in (18) in German (see Grewendorf (1988), Kiss (1995), and Haider (2010), among many others). The sentence is ambiguous, with the more natural interpretation assigning the negative item that is part of the object DP of the embedded verb (*niemanden* ('no-one')) wide scope: The natural reading is one where it is not the case that he intended to disturb anyone (and not one where he actually intends that no-one will be disturbed).

- (18) dass er [_α niemanden zu stören] beabsichtigt hat
 that he-NOM no-one.ACC to disturb intended has

However, there would seem to be a general consensus that (18) is not to be analyzed as a genuinely bi-clausal structure; either sentential negation is already placed in the matrix clause (as part of the object DP in (18), in which case the phenomenon is at best an instance of the non-locality of movement), or clause union (or complex predicate formation) has applied, and the structure is monoclausal or begins with. More interesting in the present context is the status of English constructions like those in (19-ab) (see Klima (1964), Kayne (1998)), where negation can take wide scope in the presence of clearly bi-clausal structures, thereby giving rise to non-local, extended scope of negation.

- (19) a. I will force you [_{CP} to marry no-one]
 b. She has requested [_{CP} that they read not a single book]

Next, obligatory *control* structures as in (20) are inherently non-local if one assumes that they qualify as biclausal, with an empty category (like, perhaps, PRO) in the embedded subject position.

- (20) John₁ tries [_{CP} PRO₁ to win]

Similarly (and perhaps even more strikingly), in languages with *switch reference* systems, there is a special marker on the verb of some clause CP₂ if the subject of CP₂ is coreferent with the subject of an immediately adjacent clause CP₁ that is part of the same syntactic structure. In addition, in cases of disjoint reference of the two subjects, there often is another type of marker (a ‘different subject marker’) on CP₂. Thus, it seems that in order to determine marker choice in CP₂ (same subject marker or different subject marker), the referential value of the two subjects must be compared. Some relevant examples with same subject (SS) marking and different subject (DS) marking in Choctaw are given in (21-a) and (21-b), respectively (see Broadwell (1997)).

- (21) a. [_{CP₁} [_{CP₂} John-at abiika-haatokoo-sh] ik-iiy-o-tok]
 John-NM sick-because-SS III-go-NEG-PT
 ‘Because John₁ was sick, he₁ didn’t go.’
 b. [_{CP₁} [_{CP₂} John-at abiika-haatokoo-n] ik-iiy-o-tok]
 John-NM sick-because-DS III-go-NEG-PT
 ‘Because John₁ was sick, he₂ didn’t go.’

As noted in the introduction of Weisser (2012), this is clearly a non-local dependency, and it is typically modelled as such in the literature, usually by invoking principles of binding theory (see Finer (1985), Watanabe (2000)).²

Finally, (semantic) binding of items that are interpreted as variables is often non-local, and sometimes radically so. Consider the case of bound variable pronouns, as in the German example in (22).

- (22) *Jeder Student*₁ denkt [_{CP} dass die Prüfung klappen wird [_{CP} wenn *er*₁
 every student thinks that the exam work out will if he
 sich bemüht]]
 REFL tries

Assuming an approach like the one in Heim & Kratzer (1998), the λ operator associated with a quantified DP like *every student* in (22) can be arbitrarily far

² Still, there is evidence that switch reference obeys some locality restrictions; e.g., same subject marking cannot skip an intervening CP.

away (provided that c-command is available) from the variable that it binds (*he* in (22)).

2. Strategies for analysis

Three general types of approach can be distinguished in view of non-local dependencies in syntax. First, one can pursue the hypothesis that dependencies that look as though they are non-local can in fact be shown to be local on closer inspection. Let us call this kind of approach the *spurious non-locality* approach. Second, one may bite the bullet and simply postulate that syntactic dependencies can in fact be non-local, and there is no reason not to assume that syntactic theory can handle non-local dependencies directly. Let us call this strategy a *non-local modelling* approach. And third, one may argue that instances of non-local dependencies should be decomposed into sequences of smaller, local dependencies. This is the *local modelling* approach that is the primary topic of the present volume. Let us go through the three kinds of approaches in a bit more detail.

2.1. Spurious non-locality

For many syntactic dependencies that would seem to qualify as non-local at first sight, it has been argued that closer scrutiny might reveal them to be local after all. Still, it seems fair to conclude that spurious non-locality approaches have not all been successful to the same extent with reanalyzing the different kinds of (seemingly) non-local dependencies as local dependencies.

2.1.1. Spurious non-locality: reflexivization

With respect to non-local *reflexivization* (see subsection 1.3), a spurious non-locality approach would seem to qualify as the standard approach, given the state of the art. On this view (see Pollard & Sag (1992), Reinhart & Reuland (1993), Büring (2005)), typical instances of reflexivization are inherently local (confined to minimal predicate/argument structures, or at last to minimal clauses); and what looks like non-local reflexivization does not actually involve reflexive pronouns that must find a binder in some local domain, but rather ‘exempt’ anaphors that are governed by concepts like *logophoricity* (see Sells (1987)): A logophoric pronoun refers to the source of an embedded proposition; it can always show up as a first person pronoun if the embedded proposition is transformed into a separate quotation (with *John said that he.LOG will leave* becoming *John said: “I will leave”*); and it may in principle also occur without an (overt) antecedent. Although this kind of approach has proven successful in certain areas, it can be

noted that it still gives rise to a number of problems: A uniform concept of *reflexive* (‘anaphor’, in Chomsky’s (1981) terminology) becomes unavailable. (Plus, the notion of reflexivity as it is used in Reinhart & Reuland (1993) cannot be defined without recourse to reflexives.) Furthermore, it becomes more difficult to capture cross-linguistic variation. Third, the generalization that long-distance reflexives are always morphologically simplex remains unaccounted for. And finally, it seems that there are cases of long-distance reflexivization where a concept like logophoricity does not seem to be involved.

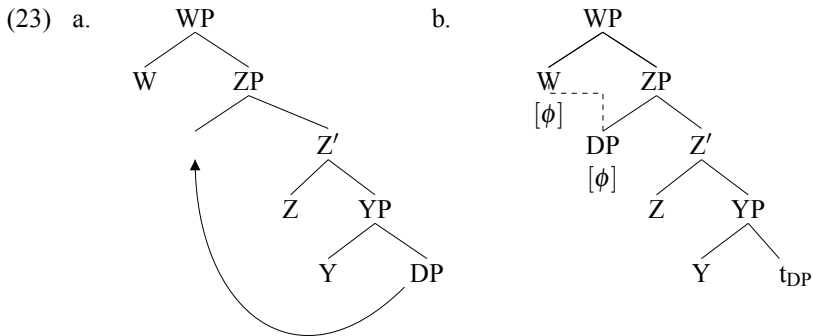
2.1.2. Spurious non-locality: case assignment

Next, as regards non-local *case assignment* (see subsection 1.4), the first thing to note is that clear cases involving a genuine long-distance dependency seem to be few and far between. As remarked above, instances of ECM with infinitives can be given a local analysis by assuming the absence of a clause boundary and/or complex predicate formation, and instances of ECM with finite clauses often suggest that the case-marked item has undergone movement to the matrix clause. Based on an analysis of VP-internal (and apparently non-locally assigned) nominative DPs in Icelandic, McFadden (2009) explicitly advances the generalization that the only case that can show up in non-local configurations is the nominative (which he takes to be assigned by default, i.e., without a case assigner being present in the structure). Still, as we have seen, there are a couple of phenomena suggesting that non-local case assignment might sometimes be an option.

2.1.3. Spurious non-locality: agreement

In the area of non-local *agreement* (see subsection 1.5), the spurious non-locality approach is actually one of the most widely adopted strategies of analysis. Analyses of LDA adhering to this general pattern come in two varieties. First, it is sometimes argued that the matrix verb and the DP that it agrees with form part of the same local domain from the beginning. Against the background of Chomsky’s (2001) theory of phases (where the predicate phrase vP and the clause CP qualify as locality domains), Boeckx (2004) and Bhatt (2005) suggest that the verb and the DP that undergo LDA are part of the same phase; this may be so either because there is very little phrase structure involved (see Boeckx (2004)), or because phases can indeed be somewhat bigger than is normally assumed (see Bhatt (2005)): On this view, LDA only affects restructuring (‘coherent’, ‘clause union’) infinitives. According to a second type of spurious non-locality approach, LDA arises as a consequence of the embedded DP moving to the matrix clause; i.e., on this view, non-local movement may feed local agreement.

Thus, it has been suggested (see Polinsky & Potsdam (2001), Polinsky (2003), Chandra (2005))) that DP moves to the left edge of the embedded phase (possibly higher) in LDA constructions, and thereby reaches the matrix V's local domain. Case requirements or semantic/information-structure related reasons (e.g., a topic interpretation) may then be identified as possible triggers for these movement operations. A schematic derivation for this kind of analysis is given in (23): DP moves from the embedded local domain YP (which may be identified as the complement of a phase head, or as a phase) to the matrix domain in (23-a), and as a consequence, it can locally agree with a matrix verb in (23-b).



Of course, this analysis does not get rid of long-distance dependencies per se – the movement operation preceding agreement in the matrix clause is not strictly local. What is more, such an approach clearly depends on the assumption that movement of DP needs to occur for LDA to take place; however, a brief glance at the examples in (15) already makes it clear that movement to the edge of the embedded YP will often have to be assumed to be covert; the DP in question is typically not pronounced in the position in which it needs to show up to effect local agreement with the matrix predicate.

2.1.4. Spurious non-locality: control and switch reference

In the same way, some of the other (apparently) non-local phenomena mentioned above may be reanalyzed as involving only a local dependency. For instance, if *control* constructions do not actually involve two separate clauses with two separate subjects (one of them remaining without phonological realization), but rather a monoclausal structure, the non-locality issue disappears entirely; cf., among many others, Bresnan's (1982) Lexical Functional Grammar (LFG) analysis, where a control predicate embeds a non-clausal XCOMP category whose subject is identified with the control predicate's own subject, and a constraint on 'functional locality' ensures that such identification cannot be recursive (such

that the subject of an XCOMP of an XCOMP could be identified with the control predicate's subject).

Similarly, under Keine's (2011) reanalysis of *switch reference* markers as coordinating conjunctions (with SS markers realizing conjunctions of VPs, i.e., of categories that do not include an external argument yet, and DS markers realizing conjunctions of vPs, i.e., of categories with an external argument in them), the non-locality of switch reference marking emerges as spurious.

2.1.5. Spurious non-locality: movement

However, severe problems arise for this view in the domain of non-local *movement* phenomena (on the existence of which some analyses in terms of spurious non-locality may be parasitic, as we have just seen).

In some cases, instances of seemingly non-local movement may indeed be reanalyzed as local. This holds, e.g., for the displacement of (unstressed or clitic) pronouns from infinitives embedded under certain verbs ('restructuring' verbs) in languages like Spanish or German, as in (24-a) vs. (24-b) (Spanish) and (25-a) vs. (25-b) (German).

- (24) a. Luis las₁ quiere ([_α] comer t₁ (])
 Luis them wants to eat
- b. *Luis las₁ insistió [_α en comer t₁]
 Luis them insisted on to eat
- (25) a. Maria hat sie₁ heute ([_α] t₁ zu holen (]) versprochen
 Maria.NOM has them.ACC today to fetch promised
- b. *Maria hat sie₁ heute [_α t₁ zu holen] abgelehnt
 Maria.NOM has them.ACC today to fetch abgelehnt

Aissen & Perlmutter (1983) show that there is strong evidence against analyzing the construction in (24-a) as involving genuine movement of a pronominal element from a clausal complement (so-called 'clitic climbing'); rather, a clause-union operation may have been triggered by the matrix verb, and the whole construction is mono-clausal (with the clitic pronoun showing up in a perfectly regular position). Similarly, Haider (1993; 2010) and Kiss (1995) (among others) argue that the German construction in (25-a) does not involve movement from a clausal complement (either scrambling, or some special pronoun fronting); again, the assumption is that a clausal boundary α does not have to show up in the presence of a certain type of matrix verb (which permits formation of a complex predicate as a lexical property).

More generally, though, a systematic local reanalysis of more recalcitrant data involving non-local movement like those in (6) does not suggest itself in any obvious way. However, it is worth noting that partial attempts in this direction

have been made in the literature. For instance, Reis (1996) suggests that what initially looks like a case of non-local extraction from a verb-second complement clause in German (as in (26-a)), should be reanalyzed as involving only a local, clause-bound movement operation accompanied by a special type of ‘integrated’ parenthetical expression, as indicated in (26-b) (also see Kiziak (2007)).

- (26) a. [_{CP} Wen₁ denkst du [_{CP} meint Maria [_{CP} sollten
whom.ACC think you.NOM believes Maria.NOM should
wir t₁ einladen]]] ?
we.NOM invite
- b. [_{CP} Wen₁ – [denkst du meint Maria] – sollten
whom.ACC think you.NOM believes Maria.NOM should
wir t₁ einladen] ?
we.NOM invite

Interestingly, given that a standard way of producing long-distance dependencies in German is by *wh*-scope marking (accompanied by local movement), as in (27-a), and given further that movement from CPs headed by the complementizer *dass* (‘that’) (as in (27-b)) is highly marked, or indeed fully unavailable, for some speakers of Standard German, one could then come up with the radical hypothesis that for some variety of German, there is no long-distance *wh*-movement at all.

- (27) a. [_{CP} Was₁ denkst du [_{CP} wen₁ wir t₁ einladen
what.ACC think you.NOM whom.ACC we.NOM invite
sollten]]] ?
should
- b. #[_{CP} Wen₁ denkst du [_{CP} dass wir t₁ einladen
whom.ACC think you.NOM that we.NOM invite
sollten]]] ?
should

Finally, the modelling of long-distance movement dependencies carried out in analyses developed within Tree-Adjoining Grammar (TAG; see Kroch (1989), Frank (2002), and references cited there) can arguably be viewed as coming close to a local reanalysis. The basic assumption is that all long-distance dependencies must be brought about by (counter-cyclic) insertion (‘adjunction’) of so-called auxiliary trees that ‘pump up’ the local phrase structure generated thus far (so-called ‘elementary trees’). Thus a sentence like (28-a) is derived by inserting (28-b) (where *think*, which will eventually become the matrix predicate, subcategorizes for a *C'* category) into the *C'* node of (28-c). Crucially, (28-c) only has local, clause-bound movement to the minimal SpecC position.

- (28) a. What_{t₁} do you think that Mary bought t₁ ?
 b. [_{C'} do you think C'] (auxiliary tree)
 c. [_{CP} what_{t₁} [_{C'} C she bought t₁]] (elementary tree)

Extending earlier work by Brosziewski (2003), Unger (2010) develops a related, but even more radical, analysis in a minimalist approach: A *wh*-phrase that is to undergo displacement merges with V by first carrying out a *split* operation, whereby the *wh*-item itself, together with its feature *wh* that drives the operation, ends up as one part, and an empty element ϵ that bears the categorial information, ends up as another part, of a complex category. The first part is next moved to the edge domain of V, and the second part is concatenated with V by a regular merge operation. Crucially, this extremely small movement step is the *only* instance of movement that there is in the theory: The effects of long-distance displacement are brought about by successively merging other material with the non-edge (nucleus) domain of the linguistic expression created thus far, which pushes the *wh*-phrase up the tree one step after the other, until an interrogative C head is merged that then remerges the *wh*-item by removing it from the edge domain and concatenating it with the expression created so far, thereby eventually producing a non-complex linguistic expression. Still, in Unger's analysis as in the original TAG analyses, whereas the rules of grammar envisage only local movement operations, the resulting structures give rise to non-local dependencies, with the displaced item removed from its base position via arbitrarily many clause boundaries.

Finally, a dependency that may prove even more recalcitrant for a local re-analysis than long-distance movement is the binding of variables, as in (22). Here it seems that a spurious non-locality approach would have to dispense with the very concept of variable binding, and resort to a variable-free semantics (cf. Jacobson (1999), Buring (2005)).

2.2. Non-local modelling

2.2.1. Types of dependencies

There is not a lot to be said about analyses that treat non-local dependencies in syntax by non-local means. In the early days of transformational grammar, this used to be the only approach that was available, with non-local phenomena covered by transformations mapping one phrase structure tree, or P-marker (called SD, structural description), to another one (SC, structural change) (see Chomsky (1965; 1975)), and restrictions on the dependencies stated by constraints on variables in the structural descriptions (see Ross (1967), Bresnan (1976a;b)). In a few current theories of grammar, this is still a standard kind of analysis, at least for non-local *movement*. This holds, e.g., for Lexical Functional Grammar

(LFG); cf. Dalrymple (2001). Here, non-local movement dependencies can be stated as identity relations between two grammatical functions; what qualifies as a legitimate identity relation in a non-local dependency is then encoded as a *regular expression* in the phrase-structure component.

Non-local analyses of non-local dependencies have also often been proposed for other phenomena.

Thus, in the case of *reflexivization*, it has sometimes been argued (based on the hypothesis that spurious non-locality approaches do not suffice for all the relevant data) that the dependency between an antecedent and the long-distance reflexive bound by it does indeed require a non-local approach that directly correlates the two positions in order to determine whether the dependency is legitimate or not; see, e.g., Koster (1987), Manzini & Wexler (1987), and Progovac (1992).

Similarly, as regards non-local *agreement*, it has been proposed that LDA may involve a genuinely non-local dependency that should be modelled as such; see Stjepanović & Takahashi (2001), Sells (2006), and Bošković (2007), who argue that non-local agreement may selectively circumvent locality domains in a way that other dependencies may not. For instance, Bošković (2007) identifies the *phase* as the relevant locality domain and concludes (in contrast to Boeckx (2004) and Bhatt (2005)) that LDA crosses phase boundaries. However, agreement dependencies are assumed to simply be insensitive to intervening phases, by stipulation; so the phenomenon emerges as truly non-local under this analysis.

As for non-local *case assignment*, most of the existing analyses are inherently non-local (e.g., Ura's (2007) analysis of ECM in Kansai Japanese (see (11)) simply implies case assignment across a CP boundary, albeit one which is classified as "not a strong phase"). With respect to the subcase of what Silverstein (1976) called 'global case marking' (see (13)), Aissen (1999) and de Hoop & Malchukov (2008) develop non-local accounts according to which ϕ - and definiteness-related properties of the external argument DP and ϕ - and definiteness-related properties of the internal argument DP can simultaneously be taken into account in order to determine whether the verb assigns case.

Similar conclusions can be drawn for all the other cases of non-local dependencies discussed above: An analysis in terms of non-local modelling would always seem to qualify as the most straightforward approach, and has regularly been pursued; often, it qualifies as the standard approach, too.

2.2.2. Potential arguments against non-local modelling

However, non-local approaches to non-local dependencies require scanning large amounts of structure, which is sometimes considered dubious from a *con-*

ceptual point of view (see McCloskey (1988) for a sketch of relevant considerations underlying the general abandonment of non-locality in syntactic theory). Sometimes it is argued (particularly in analyses of minimalist provenance) that a local modelling of non-local dependencies brought about by a reduction of syntactic domains (and concurrent postulation of a means to pass on the required pieces of information in a local fashion, thereby ultimately connecting the two items taking part in the long-distance dependency) may contribute to “efficient computation” by reducing “computational complexity” (see, e.g., Chomsky (2001; 2005; 2007)). This would then imply a conceptual argument in favour of a local modelling of non-local dependencies. However, such work typically does not provide a formal theory of complexity against which such claims could be checked. Therefore, it seems fair to conclude that one should treat these kinds of arguments with caution, at least for the time being.³

Another conceptual argument for a local (as opposed to a non-local) modelling of non-local dependencies that is perhaps more straightforwardly relevant comes from learning theory (see Heck & Müller (2010)): In a local approach, the set of possible grammars that the language learner needs to consider is reduced (see, e.g., Chomsky (1972), Sternefeld (2000)). The argument goes as follows. Let T_1 be a theory according to which every grammar of a natural language obeys the constraint that a dependency may not cross more than one clause boundary. Next, let T_2 be a theory according to which arbitrarily many clause boundaries may be crossed by syntactic dependencies. If one compares T_1 and T_2 , it turns out that, *ceteris paribus*, the set of possible grammars of T_2 is a superset of the set of possible grammars of T_1 . The reason is that T_2 also (but, crucially, not exclusively) contains grammars that generate only dependencies which are more local in the sense that they cross at most one clause boundary. This consideration may suggest that a local reanalysis of non-local dependencies in syntax may push theory formation further into the direction of explanative adequacy.⁴

Furthermore (and perhaps even more importantly), there are *empirical* challenges for a non-local approach to non-local dependencies. Most obviously, these challenges arise in the area of long-distance *movement*: The syntactic structure between a displaced item and its base position may show certain morphological exponents and/or alternations that cannot be present outside this area, i.e., in domains that are not affected by movement (see Lahne (2009) for comprehensive discussion). This would seem to raise problems for a non-local approach, and ar-

³ This is not to say that we take it to be impossible, or even unlikely, that breaking down single non-local dependencies into multiple local ones may lead to a reduction of complexity, once the relevant notions are properly defined; see Gärtner & Michaelis (2007) and Graf (2009) for relevant discussion.

⁴ In this context, also compare Lightfoot (1994) on the hypothesis of ‘degree-0 learnability’ that restricts parameter learning to matrix clauses, hence, to local dependencies.

gue for a segmentation of longer movement dependencies into smaller steps (see below). Thus, in some languages, *wh*-movement may be *partial* in the sense that the movement operation does not overtly reach the target position in the interrogative clause from which the *wh*-phrase takes scope, but stops in some lower position in the left periphery of a clause; cf., e.g., the phenomenon of partial *wh*-movement in Ancash Quechua (see Cole (1982)), Iraqi Arabic (see Wahba (1992)), and German (see Cheng (2000), Sabel (2000)).⁵ In other languages, the *wh*-phrase does show up in its scope position, but there are partial or total reduplication copies in intermediate positions; see Plessis (1977) on Afrikaans and Fanselow & Mahajan (2000), Nunes (2004) on German; in Dutch, *wh*-movement may strand part of the *wh*-phrase along the movement path (see Barbiers (2002)); also see McCloskey (2000) on a similar phenomenon in Irish English.

In yet other languages, the reflex of successive-cyclic shows up on some other, movement chain-external, element along the movement path. Relevant cases include the choice of complementizer in Modern Irish (see McCloskey (1979; 2002), Sells (1984), Noonan (2002), Lahne (2009), among many others); obligatory verb raising to C in Spanish (see Torrego (1984), Baković (1998)), in Basque (see Ortiz de Urbina (1989)), and in Belfast English (see Henry (1995)); the selection of subject pronouns in Ewe (see Collins (1993; 1994)); special verbal morphology ('*wh*-agreement') in Chamorro (see Chung (1994; 1998), Lahne (2009)); tonal downstep in Kikuyu (see Clements et al. (1983)); occurrence of the morphological exponent *no* in Duala (see Epée (1976), Sabel (2000)); *meN* deletion in colloquial Singapore Malay (see Cole & Hermon (2000), Fanselow & Ćavar (2001)); and participial agreement in Passamaquoddy (see Bruening (2001)).

Let us look a bit more closely at two such reflexes of long-distance movement, beginning with the variation in complementizer shape in Modern Irish. Here, complementizers vary in form, depending on whether or not movement has taken place from the clause. The regular form of declarative C is *go*; see (29-a). However, if the left periphery (CP domain) of a clause is targetted by movement, C takes the form *aL*; see (29-bc); this is an instance of displacement-related morphology, i.e., a reflex of movement. In addition, if a displacement dependency is expressed without movement (which McCloskey (2002) argues to be an option), by a resumptive pronoun in situ, C takes the form *aN*; see (29-d).

- (29) a. Creidim gu-r inis sé bréag
 I-believe C:*go*-PAST tell he lie
 'I believe that he told a lie.'

⁵ However, note also that the German partial *wh*-construction, unlike its Ancash Quechua and Iraqi Arabic relatives, but like its Hungarian counterpart, goes hand in hand with the presence of an overt *scope marker* (*was* in German) that may plausibly be reanalyzed as genuine *wh*-object quantifying over propositions, and the lower *wh*-clause then acting as a restriction of this quantifier; see Dayal (1994) and the contributions in Lutz et al. (2000).

- b. Céacu ceann₁ a dhíol tú t₁ ?
 which one C:aL sold you
 ‘Which one did you sell?’
- c. an t-ainm OP₁ a hinnseadh dúinn a bhí t₁ ar an áit
 the name C:aL was told to us C:aL was on the place
 ‘the name that we were told was on the place’
- d. Céacu ceann a bhfuil dúil agat ann ?
 which one C:aN is liking at you in it
 ‘Which one do you like?’

As McCloskey (2002) shows, these strategies can be mixed, giving rise to intricate patterns of morphological reflexes on the movement path (the phenomenon of ‘chain hybridization’; also see Asudeh (2004), Huybregts (2009), and Assmann et al. (2010)).

Next, consider the reflexes of long-distance Movement in Ewe, as described by Collins (1993; 1994). As shown in (30-a), in embedded subject positions that have not been crossed by movement, the form of the masculine subject pronoun is always *é*, never *wo*. However, if movement takes place across it (focus movement in the case at hand), the embedded subject pronoun can take either form; i.e., optional *wo* is a reflex of movement into the matrix clause.

- (30) a. Kofi₁ e me gble na t₁ [_{CP} be *é/*wo* fo Kosi]
 Kofi FOC I said to that he hit Kosi
 ‘It was Kofi that I told that he hit Kosi.’
- b. Kofi₁ e me gble [_{CP} t'₁ be *é/wo* fo t₁]
 Kofi FOC I said that he hit
 ‘It was Kofi that I said that he hit.’

Next to the *formal* (morphological or syntactic) reflexes of movement that may show up in parts of syntactic structure between a base position and the target position in the languages of the world, there can also be *semantic* reflexes; in particular, positions that are included in a movement dependency may act as positions into which *reconstruction* can take place (see Fox (2000)).

It should be uncontroversial that the existence of these reflexes of movement initially favours a local modelling of non-local dependencies, in the sense that the reflexes suggest a partition of the structure affected by movement into sub-parts, and the availability of the relevant information (*viz.*, that some domain has been affected by movement) for other (e.g., morphological) operations. Against this background, the question arises of how reflexes of movement can be captured in non-local approaches to non-local movement. Dalrymple (2001, ch. 14) develops a non-local LFG approach that addresses this issue. As mentioned on page 18, in this approach, a non-local movement dependency is treated non-locally, as an identity relation involving a moved item and its base position (more specifically, involving a function characterizing the target position of movement,

like TOPIC or WH, and the grammatical function characterizing the base position); what qualifies as a permissible movement relation is stated as a regular expression in the phrase-structure component.

This analysis does not involve smaller, intermediate movement steps; and, as such, it does not imply any *record*, or *track-keeping device*, of a non-local movement dependency in the syntactic structure that shows up between the displaced item and its base position (no feature, no trace, etc.; see below). In view of the existence of morphological reflexes of movement, Dalrymple (2001) proposes that a track-keeping device can be *added* to phrase structures after all, so as to provide a point of reference for the morphological reflex of movement. For concreteness, Dalrymple proposes a principle demanding that the mothers of all COMPS and GFs that satisfy the regular expression linking a topic function to a grammatical function (i.e., all material that is part of the movement path) must bear an [LDD] ('long-distance dependency') feature with the value [+]. In addition, a *minimal solution* constraint is needed that ensures that the feature [LDD] can only show up in a syntactic structure if it is required by some principle; this has the effect of blocking the feature [LDD] in all environments that are not part of a movement dependency. This way, morphological reflexes of movement can be handled: Special movement-related morphology realizes a [+LDD] feature.⁶ This solution may be viewed as satisfactory from a purely technical point of view; but it seems clear that it is inferior to local modellings of the phenomenon (see below): The sole purpose of the [LDD] feature is to make possible accounts of morphological reflexes of movement; the feature does not play any role in bringing about, or restricting, movement dependencies per se. At least from an optimal design perspective as advanced by Chomsky (2001), such an account may therefore be considered dubious.

A second kind of potential, empirically rooted argument distinguishing between local and non-local approaches to non-local dependencies is related to the generality and plausibility of constraints on non-local dependencies. To see how this might work, consider two classic constraints on syntactic movement, viz., the Complex Noun Phrase Constraint (CNPC; see Ross (1967)) in (31-a) and the Subjacency Condition (see Chomsky (1977; 1986a), Rizzi (1982)) in (31-b) (both constraints are slightly updated to reflect current terminology).

- (31) a. *Complex NP Constraint* (CNPC):
 No element contained in a CP dominated by a DP may be moved out of that DP.

⁶ Technically, this can be brought about by appropriate lexical constraints; also see Assmann et al. (2010) on an extension of this approach to the intricate patterns involving *chain hybridization* in Modern Irish discussed in McCloskey (2002).

b. *Subjacency Condition:*

In a structure $\alpha \dots [\beta \dots [\gamma \dots \delta \dots] \dots] \dots$, movement of δ to α cannot apply if β and γ are bounding nodes.

(DP and TP are bounding nodes in English, DP and CP are bounding nodes in Italian.)

Crucially, the CNPC in (31-a) is compatible with a non-local approach to movement dependencies (and was indeed originally formulated as such, as a constraint on variables in syntax), whereas the Subjacency Condition is explicitly designed as a constraint that presupposes a local modelling of non-local movement dependencies, such that long-distance movement operations are split up into sequences of more local movement operations targeting left-peripheral ('SpecC') positions of intervening CPs, one after the other (cf. the next section). Both constraints succeed in ruling out sentences like (32), where *wh*-movement illegitimately takes place from a CP that is embedded in a DP.

(32) * $[_{DP_1}$ Which book] did $[_{TP}$ John $[_{vP}$ hear $[_{DP_2}$ a rumour $[_{CP}$ that you had read t_1]]]] ?

However, the Subjacency Condition also covers several other restrictions on movement that the CNPC is silent about (among other things, it derives the effects of the *Wh*-Island Condition (see Chomsky (1973)), the Left Branch Condition (see Ross (1967)), the Sentential Subject Constraint (see Ross (1967)), the Subject Condition (see Chomsky (1973), Huang (1982)), and some of the effects attributable to the Coordinate Structure Constraint (see Ross (1967)). It is thus more general; therefore, *ceteris paribus*, it arguably qualifies as a 'better' constraint. Crucially, the two constraints can make different predictions if the *wh*-movement dependency in (32) is split up into a sequence of smaller dependencies. Suppose first that (32) is made up of two dependencies, such that movement to the left edge of the embedded CP is followed by a second movement step to the target position in the matrix clause (as originally assumed by Chomsky (1977)). Then, the CNPC and the Subjacency Condition make identical predictions: Under the CNPC, the sentence is still predicted to be ungrammatical because the second movement step crosses a DP from within CP; under the Subjacency Condition, the sentence is ruled out because DP and matrix TP continue to be crossed in one swoop by the second movement step. Suppose next that non-local dependencies are composed of even smaller parts, with intermediate steps to the predicate phrase (vP) also being required (see Chomsky (1986a; 2001; 2008)). Under this assumption, the CNPC still excludes the example, as intended (CP and DP are crossed by a single movement step, even if that step ends up in a lower position than before), whereas the Subjacency Condition does in fact not exclude (32) anymore (vP intervenes between the two bounding nodes TP and DP). – Then again, suppose that the CNPC were to be minimally modified, such that, e.g., CP is replaced with C' , or "contained" is un-

derstood in such a way that the specifier/edge of an XP does not actually count as (properly) “contained” in XP (see Baker (1988), Sportiche (1989), Chomsky (2001) for suggestions in this direction), and suppose further that intermediate steps only affect CP edges (not vP edges). In that case, the CNPC would make wrong predictions for (32) (since it should not be violated anymore), whereas the Subjacency Condition would correctly predict (32) to be impossible.

All these considerations show that arguments distinguishing between local and non-local approaches to non-local movement dependencies can be constructed on the basis of constraints that are independently given. However, we would like to emphasize that the examples just mentioned are given here only for the purpose of illustration of the general schema of the argument. Both the Subjacency Condition and the CNPC have been convincingly argued to be inadequate (see Riemsdijk (1978), Koster (1978), and the overview in Müller (2011)), and one of the central problems that have been identified – viz., the fact that they are *two*-node rather than *one*-node locality constraints – turns out to be the one that makes them particularly interesting as a potential means to distinguish local from non-local approaches to long-distance dependencies. Still, the overall conclusion remains valid: The two types of theories can be distinguished by their behaviour vis-à-vis well-established syntactic constraints (see Heck & Müller (2003; 2007) for several applications of this general logic in the slightly different domain of optimization procedures).

2.3. Local modelling

2.3.1. Local modelling: movement

Third and finally, non-local syntactic dependencies can be modelled in a local way, by partitioning the longer dependencies into combinations of smaller subdependencies. Such an approach has been pursued for all the dependencies mentioned so far, but first and foremost for *movement*. Consider an example like (33).

(33) What do you think that Mary bought ?

(33) would involve a single non-local (‘unbounded’) movement operation in earlier transformational approaches, as shown in (34) (with anachronistic notation, including the presence of a trace in the base position).

(34) [_{CP} What₁ do you think [_{CP} that Mary bought t₁]] ?

In contrast to this, Chomsky (1973) proposes that long-distance (*wh*-) movement as in (35) applies *successive-cyclically*, from one clausal edge position to the next one (‘COMP-to-COMP movement’, in the then contemporary conception of

phrase structure; movement from SpecC to SpecC in more current terminology). This is shown in (35).

(35) [_{CP} What₁ do you think [_{CP} t'₁ that Mary bought t₁]] ?

Given the Subjacency Condition in (31-b) (cf. Chomsky (1977)), breaking down the non-local movement dependency into smaller parts is indeed unavoidable: If movement did not first target the embedded SpecC position but went directly to the scope position in the matrix clause, the Subjacency Condition would be violated, with both the embedded TP and the matrix TP crossed by a single movement operation; and ungrammaticality should result in the same way that it results in cases of *wh*-islands (see (36)), where the use of the intermediate SpecC position is blocked (because this position is already filled, and assuming that specifiers are unique rather than multiple).

(36) * [_{CP} What₁ do you know [_{CP} who₂ C t₂ bought t₁]] ?

Such a moderately local approach to long-distance movement was prevalent for a while in the Principles-and-Parameters framework (see, e.g., Chomsky (1981)), but it is abandoned in Chomsky (1986a) in favour of an analysis that envisages even more local movement steps, by postulating movement to the left edge of the predicate domain (VP) in addition. With the advent of *phase theory* as an integral part of the minimalist program, this general idea has been systematized as movement to *phase edges*, where CP and vP are identified as special derivational units, viz., phases; see Chomsky (2000; 2001; 2008), Fox (2000), Nissenbaum (2000), Bruening (2001), Barbiers (2002), and many others. Consequently, a derivation of a sentence like (33) is assumed to involve four separate movement operations, each leaving a trace (or, in most versions of the minimalist program, a copy of the moved item – but these differences are irrelevant for the issues currently under consideration); see (37).

(37) [_{CP} What₁ do you [_{vP} t''' think [_{CP} t'' that Mary [_{vP} t'₁ [_{v'} t_{Mary} [_{VP} bought t₁]]]]]] ?

The fact that movement steps must be local, successively targetting the next available phase edge on the way to the ultimate landing site, does not have to be stipulated in this kind of approach. Rather, it can be derived from the Phase Impenetrability Condition (PIC) in (38) (see Chomsky (2000; 2001)).

(38) *Phase Impenetrability Condition (PIC)*:

The domain of a head X of a phase XP is not accessible to operations outside XP; only X and its edge are accessible to such operations.

The PIC explains why successive-cyclic movement is *required*; but assuming that all syntactic operations must be triggered by designated features (as it has standardly been assumed in minimalist approaches, but see Chomsky (2008)

for a different view), this means that there must also be some device that guarantees that the intermediate movement steps in (37) are *permitted* in the first place. There are various possibilities to ensure this. First, it has been postulated that there are features triggering the local movements to phase edges on the phase heads ('edge' features) that are available, either freely or under certain conditions (see Chomsky (2000; 2001), Fanselow & Mahajan (2000), Sabel (2000), McCloskey (2002), Müller (2011) for some suggestions). Second, it has been claimed that intermediate movement steps can minimally violate the prohibition against non-feature driven movement (Last Resort) so as to satisfy a higher-ranked constraint (which is identified as Phase Balance in Heck & Müller (2003)). And third, it might be that intermediate movement steps are not the result of genuine movement operations; rather, intermediate traces are inserted (counter-cyclically, i.e., after movement to the final target position has taken place) into appropriate positions (see Chomsky's (1995) concept of Form Chain, and also Takahashi (1994), Fox (2000), and Boeckx (2003), among others).

Sometimes it has been argued that DP also qualifies as a phase (see Svenonius (2004), Heck & Zimmermann (2004), Matushansky (2005), Kramer (2007)); if so, the PIC also requires local movement steps to SpecD in cases of movement from DP (also see Cinque (1980), Shlonsky (1988) for earlier approaches of this kind). Abels (2003; 2012) argues for a phase status of PP, with the same consequence for successive-cyclic movement. Furthermore, it has been suggested that TP may also qualify as a phase (at least in some languages); see Richards (2004; 2011). Given the PIC, this then requires movement to take place successive-cyclically via SpecT. Finally, in some approaches to movement phases are viewed as more flexible objects that may vary across, or even within, languages; see Grohmann (2000), Bobaljik & Wurmbrand (2003; 2005), Marušič (2005), Gallego & Uriagereka (2006), den Dikken (2007), Gallego (2007), and Bošković (2012). On such an approach, non-local movement dependencies have to be decomposed into smaller steps (of varying degrees of locality) in a non-homogeneous way.

In contrast to all these approaches based on selective phase status of XPs, it has also been argued that *all* XPs qualify as locality domains for movement (see Koster (1978), Riemsdijk (1978)). In line with this, it has been suggested that non-local movement must take place via *all* intermediate XP edges. This may either follow from the PIC (if all phrases qualify as phases), or may need to be stated separately; see, inter alia, Sportiche (1989), Takahashi (1994), Agbayani (1998), Chomsky (1995; 2005; 2008), Bošković (2002), Boeckx (2003), Boeckx & Grohmann (2007), Müller (2011). In such an approach, an example like (33) has the derivation in (39), with the non-local movement dependency split up into a sequence of six (or more, if more functional categories in the clausal spine are

postulated) separate, extremely local intermediate movement steps before the final movement step to the target position takes place.⁷

- (39) [_{CP} What_i do [_{TP} t₁^{''''''} you [_{VP} t₁^{''''} [_{VP} t₁^{''''} think [_{CP} t₁^{''} that [_{TP} t₁^{''} Mary [_{VP} t₁^{''} [_{VP} bought t₁]]]]]]]]] ?

An even more local (and even more radical) modelling of non-local movement dependencies involves partitionings where not just every intervening phrase, but *every intervening node* of the movement path encodes the information that movement has taken place across it. The basic idea goes back to Gazdar (1981; 1982); the resulting technique is usually subsumed under the label of ‘SLASH feature percolation’. In Gazdar’s work, the initial motivation for this mechanism is based on complexity considerations: Given (i) that the computational complexity of classical transformational grammars (as in Chomsky (1965)) is due not to the base component (which consists of context-free phrase structure rules), but rather to the transformational component (with transformations being powerful tools that map phrase markers to phrase markers), and given (ii) furthermore that transformations seem nevertheless required to model displacement, the task is to capture displacement phenomena without transformations. To this end, Gazdar (1981) introduces SLASH features. On this view, with movement transformations gone, ‘movement’ emerges as a mere metaphor.

More specifically, Gazdar (1981) distinguishes between three domains of a movement dependency. First, there is the *top*, the landing site of movement. Second, there is the *middle*: the movement path. And finally, there is the *bottom*: the base position of the moved item; see (40).

- (40) $\underbrace{[\text{What} \dots]}_{\text{top}} \underbrace{[\text{do you think that Mary bought } [t]]}_{\text{middle}} \underbrace{]}_{\text{bottom}}$

The bottom and top parts of a movement construction can be addressed without further ado in a context-free phrase structure grammar; the crucial innovation that Gazdar introduces concerns the passing on of information in the middle of the dependency. The central concepts put forward in Gazdar (1981) are those of a *derived category* and of a *derived rule*. Given a set V_N of basic category symbols, the set of derived categories $D(V_N)$ can be defined as in (41).

- (41) $D(V_N) = \{\alpha/\beta: \alpha, \beta \in V_N\}$

Thus, if, say, S (CP) and NP were the only kinds of categories available, then there would be four derived categories, viz., NP/NP, NP/S, S/NP, and S/S. What follows the basic category has become known as the SLASH *feature*. The SLASH feature signals that something is missing (and what). Next, given the set G of

⁷ This is roughly in compliance with Barrett’s (1967) assumption that all movement is accomplished in six stages.

base rules of the grammar, derived rules can be produced on the basis of derived categories: For each syntactic category β , there is a subset of the set of non-terminal symbols V_N whose members can dominate β according to the rules in G . This set is called V_β ($V_\beta \subseteq V_N$). Then, for each category β ($\beta \in V_N$), a finite set of derived rules $D(\beta, G)$ can be defined, as in (42).⁸

(42) *Derived Rule Schema:*

$$D(\beta, G) = \{ \alpha / \beta \rightarrow \sigma_1 \dots \sigma_i / \beta \dots \sigma_n : \alpha \rightarrow \sigma_1 \dots \sigma_i \dots \sigma_n \in G \ \& \ 1 \leq i \leq n \ \& \ \alpha, \sigma_i \in V_\beta \}.$$

According to (42), for every basic (context-free) phrase structure rule in the grammar, derived rules are generated in which the symbol on the left-hand side of the rewrite arrow and exactly one symbol on the right-hand side (i.e., a symbol in the replacing string) are derived categories, enriched by identical information about what is missing (unless, that is, the right-hand symbol can never dominate the missing category according to the basic rules G , as is always the case with X^0 -categories). Thus, if, e.g., the context-free phrase structure rules in (43) are part of G , then the derived context-free phrase structure rules in (44) will be part of $D(NP, G)$, and thus also available in the grammar.

- | | | | |
|---------|-----------------------|---------|--|
| (43) a. | $S \rightarrow NP VP$ | (44) a. | $S/NP \rightarrow NP/NP VP, S/NP \rightarrow NP VP/NP$ |
| b. | $VP \rightarrow V NP$ | b. | $VP/NP \rightarrow V NP/NP$ |
| c. | $VP \rightarrow V S'$ | c. | $VP/NP \rightarrow V S'/NP$ |

Derived rules regulate the percolation of SLASH features in the *middle*; they pass on the information what is missing in an extremely local way throughout syntactic structures. In addition, rules are needed for the *top* and for the *bottom* of displacement constructions. These rules are non-derived rules. The rule for the bottom is basically just a rule schema that introduces traces into the structure; cf. (45-a) (where α can be any category, e.g., NP). Finally, there are various rules for the top, depending on the kind of movement dependency (*wh*-movement, topicalization, etc.) that is to be captured. Gazdar's (1981) rule for (NP) relativization in English is given in (45-b). Here, R is the category for a relative clause, $NP_{[\pm wh, +pro]}$ is the moved relative pronoun (which may be absent in the case of objects), and S/NP is a slashed S category as it occurs in (44-a). The asymmetry in (45-b) (a slashed category on the right-hand side of the rule, a non-slashed, basic category on the left-hand side) ensures that the movement dependency is not propagated further up the tree once the target position of the displaced item is reached.

- (45) a. $\alpha / \alpha \rightarrow t$

⁸ Gazdar (1981) actually has node admissibility conditions of the type $[_S NP VP]$ instead of phrase structure rules of the type $S \rightarrow NP VP$, but this difference can be neglected in the present context.

- b. $R \rightarrow (NP_{[\pm wh, +pro]}) S/NP$

In the standard Generalized Phrase Structure Grammar (GPSG) approach subsequently developed in Gazdar et al. (1985), the essentials of this approach have been maintained. However, there are some differences concerning all three domains of a movement dependency; most importantly, SLASH is explicitly viewed as a (category-valued) feature of categories. As for the bottom, (45-a) is replaced with the SLASH Termination Metarule in (46-a); given that there is a feature co-occurrence restriction according to which the presence of [+NULL] implies the simultaneous presence of [SLASH], this provides a starting point of SLASH feature percolation, i.e., it initiates the movement dependency. The top of the dependency is accounted for basically as in (45-b), by assuming a general filler-gap rule schema as in (46-b) (where H stands for whatever is the head of S in a given context, with options including VP and S again). Most importantly, the middle of the dependency – i.e., local SLASH propagation through syntactic structures, ultimately connecting the base position with the displaced item – is handled by assuming that SLASH is not just a *head* feature (that is passed on along the projection line), but also a *foot* feature, which implies that it is shared between daughter and mother not only along the projection line of the head, but also between a non-head daughter and its mother. This is ensured by an indently motivated constraint, the so-called *Foot Feature Principle*.

- (46) a. SLASH Termination Metarule:
 $X \rightarrow W, XP \Rightarrow X \rightarrow W, XP[+NULL]$
 b. $S \rightarrow XP, H/XP$

On this view, a SLASH feature percolation analysis of (33) looks as in (47). As before, the assignment of category labels and assumptions about fine-grained aspects of clause structure are anachronistic, with orthogonal assumptions between analysis types minimized, so as to ensure that maximal comparability; also note that “s” in (47) is a shorthand for “[SLASH:[DP₁ *what*]]”.

- (47) [_{CP} What₁ [_{C':s} do [_{TP:s} you [_{T':s} T [_{VP:s} t_{you} [_{v':s} v [_{VP:s} think [_{CP:s} that [_{TP:s} Mary [_{T':s} T [_{VP:s} t_{Mary} [_{v':s} v [_{VP:s} bought t₁]]]]]]]]]]]]]]]]]]] ?

This extremely local SLASH feature-based modelling of non-local movement dependencies has also been adopted in Head-Driven Phrase Structure Grammar (HPSG) (see Pollard & Sag (1994), Sag & Wasow (1999)), with very few changes. For one thing, SLASH does not take a *category* as its feature value anymore, but rather a *list of categories*, so as to permit multiple extraction from a given category, as it is in fact required for examples like (47) anyway if one assumes that external argument DPs are base-generated in Specv and then moved to SpecT in English; see already Maling & Zaenen (1982), and Pollard & Sag

(1994).⁹ For another, there is a controversial discussion in HPSG as to whether *traces* can (or should) be dispensed with in the modelling of the bottom of a dependency; see Sag & Wasow (1999), Levine & Sag (2003a;b), and Müller (2007) for the two different options.

Mechanisms very similar to Gazdar et al.'s (1985) SLASH feature percolation have also been developed in Principles-and-Parameters-based work; cf. in particular the related concepts of *gap phrase* and *operator feature percolation* in Koster (2000) and Neeleman & van de Koot (2010), respectively.¹⁰

Unlike non-local approaches, local approaches to movement dependencies are in principle well designed to capture morphological (and other) reflexes of displacement because they presuppose that the syntactic domain where the reflex shows up is materially affected – either by an actual intermediate movement operation, or by a trace (or both), or by a SLASH feature that can be used for special morphological realization (or be held responsible for other reflexes); see in particular Sag & Wasow (1999) and Bouma et al. (2001) (also cf. Assmann et al. (2010) for the more intricate patterns of Modern Irish; and see above).

For standard, run-of-the-mill movement dependencies (i.e., ignoring complications like parasitic gaps and across-the-board extraction; see Chomsky (1982), Ross (1967)), current minimalist approaches that envisage movement to all intervening XP edges (producing structures like (39)) turn out to be very similar to SLASH feature percolation approaches (which produce structures like (47)).¹¹ However, local approaches that envisage designated intermediate landing sites,

⁹ This is a simplification, though. Technically speaking, SLASH in HPSG must take sets of local complements of categories as values. (Ultimately, this complication is due to the necessity to avoid what has become known as the ‘node vortex problem’ (with SLASHes inside SLASHes); see Pullum (1989).)

¹⁰ In his taxonomy of approaches to movement dependencies, McCloskey (1988) also groups *path*-based approaches as they have been developed by Kayne (1982), Pesetsky (1985), Koster (1987), and Longobardi (1985), together with SLASH-feature percolation based approaches, and considers them both as fundamentally distinct from approaches that envisage successive-cyclic movement. While there are indeed some similarities (most notably, SLASH-based and *path*-based approaches are both inherently representational rather than derivational, with ‘movement’ reduced to a metaphor), it would seem that these are mostly orthogonal to the issues currently under consideration. More important in the present context are the fundamental differences, which McCloskey (1988, 30) also notes: First, in path-based approaches to displacement, the movement path is “not formally marked in any way”. And second, “one inspects the geometry of the entire path between an empty position and its binder, to determine whether or not a given structure is well-formed.” From the present perspective, this means that path-based approaches qualify as instances of *non-local* approaches to movement, of roughly the same kind as the standard LFG approach developed by Dalrymple (2001) (see above). Consequently, they are also subject to the criticism raised above with respect to morphological (and other) reflexes of movement for the approach pursued in Dalrymple (2001).

¹¹ In fact, it is hard to see how fundamental differences between these two approaches with respect to empirical predictions for reflexes of movement could arise: Even though SLASH is present on every projection of an XP on the movement path whereas intermediate traces only show up in specifiers of XP, the latter items are presumably still close enough to all relevant items in XP to

like the COMP-to-COMP movement approach yielding structures like (35), or the classic phase-based approach yielding structures like (37), differ from these approaches in their empirical predictions for reflexes of displacement because, given independently motivated assumptions about the locality of certain syntactic or morphological operations, the relevant information may not be present. As for approaches that assume genuinely unbounded movement (see (34)), they either cannot handle reflexes of displacement easily in the first place, or they behave like extremely local minimalist and SLASH-based approaches in this respect (recall the role played by [LDD] features in Dalrymple (2001)). The two groups of approaches to movement emerging from this perspective have been labelled *uniform movement path* approaches and *punctuated movement path* approaches in Abels (2003; 2012); see (48).

(48) *Uniform vs. punctuated movement paths*

	uniform path	punctuated path
unbounded movement	±	–
COMP-to-COMP movement	–	+
movement to designated phase edges	–	+
movement to all XP edges	+	–
movement by SLASH feature percolation	+	–

With respect to morphological reflexes of movement, evidence was initially taken to support a particular version of the punctuated path approach, viz., COMP-to-COMP movement. However, many of the relevant phenomena seem to involve verbal markers (e.g., *wh*-agreement in Chamorro, *meN* deletion in Malay), which would then seem to minimally support the standard phase version of the punctuated path approach (with vP and CP as phases). In this context, it is also worth noting that the ‘complementizer alternation’ facts of Modern Irish (recall (29)) may also plausibly be reanalyzed as involving verbal particles (see Sells (1984), Noonan (2002), Lahne (2009)); so the reflex may perhaps in fact not occur on C, or in the CP domain (depending partly on the analysis of VSO order in Irish). The displacement reflex in Ewe (see (30)) involves subject pronouns and may therefore be indicative of a TP (rather than vP or CP) domain affected by movement. If these tentative conclusions can be substantiated and generalized, they might then support a uniform path approach; but at present the issues are far from being resolved.¹²

Abels (2003) advances an argument for punctuated paths centering around a syntactic (rather than morphological) reflex of displacement. It is based on what

trigger any kind of reflex (morphological or other) in the XP domain, in particular on the head X. See Lahne (2009); but also Lechner (2009) for a qualification.

¹² For instance, even if the pronoun alternation in Ewe involves SpecT, this might nonetheless be due to different properties of an adjacent C head affected by intermediate movement to SpecC playing a role in morphological realization/insertion.

has sometimes been called “pit-stop reflexives”, a phenomenon that involves a potential feeding relation between movement and reflexivization (see Barss (1986), Epstein et al. (1998)). As shown in (49), reflexives that are not permitted as such because they lack a local antecedent (see (49-ac)) can extend their binding domains and find a new antecedent if they are part of a *wh*-phrase that moves to a higher clause (see (49-bd)). It suffices that the reflexive is locally bound at some intermediate point of the derivation (here designated by \square); in the final representation, the reflexive does not have to be c-commanded by its antecedent anymore (this is an instance of opaque rule interaction, viz., counter-bleeding).¹³

- (49) a. *Jane believes (that) John₁ thinks (that) she likes some pictures of himself₁
 b. Which pictures of himself₁ does Jane believe (that) John₁ thinks [_{CP} \square (that) she likes]?
 c. *Mary told John₁ that she liked these pictures of himself₁
 d. Which pictures of himself₁ did Mary tell John₁ [_{CP} \square that she liked]?

Thus, (49) shows that reflexivization must be possible in intermediate positions of movement paths. However, the examples in (49) cannot yet decide between a punctuated and a uniform approach – \square can plausibly be assumed to be SpecC, and both kinds of approaches can make the relevant information available in this position. However, Abels (2003) argues that there is an argument for punctuated paths on the basis of *raising constructions*, as in (50-b), where *wh*-movement of the DP containing the reflexive takes place across an experiencer argument of the raising predicate *seem* that may in principle license a pit-stop reflexive; see (50-a).

- (50) a. [_{DP₂} Which pictures of himself₁] did it seem to John₁ [_{CP} \square that Mary liked t₁] ?
 b. * [_{DP₂} Which pictures of himself₁] did Mary₃ seem to John₁ [_{TP} (\square) t₃ to like t₁] ?

Given the standard assumption that raising infinitives are TPs (not CPs), the argument goes as follows: Under a uniform paths approach, reflexivization should be possible via the \square position (SpecT, or TP[SLASH:DP]) in (50-b) (*to* does not block binding here; see (50-a), as well as Pesetsky (1995), Sternefeld (1997) and references cited there). Under a punctuated paths approach, reflexivization should be impossible in (50-b) if SpecT is not a landing site for successive-cyclic movement (e.g., if TP is not a phase). Since (50-b) is ungrammatical, this supports a punctuated paths approach.

¹³ The terminology here is derivational, but this is just for exposition. Barss (1986) develops a fully representational account of the relevant phenomena, in terms of *chain-accessibility sequences*.

Arguments of this general type are exactly what is needed to distinguish between different types of local modelling of non-local movement dependencies, but it is not clear that this particular argument is compelling. As noted by Boeckx & Grohmann (2007) and Boeckx (2008), sentences like (51) also lack the enrichment of binding options by movement to intermediate positions although the most deeply embedded clause is a CP, and movement to the \square position of this CP domain should suffice for creating the new binding option. This suggests that the correct generalization might be that an intervening experiencer blocks the enrichment of binding options, quite independently of the nature of the landing site involved.

(51) *Which pictures of himself₁ did Mary₂ seem to Jane₃ [_{TP} t₂ to have told John₁ [_{CP} \square that she likes t]] ?

Furthermore, assuming that reflexivization is not merely domain-based but also sensitive to intervention effects exerted by other potential antecedents, (50-b) may also be straightforwardly excluded in a uniform path approach according to which the embedded TP domain is directly affected by displacement, e.g., by intermediate movement to SpecT. Here is why: In a uniform paths approach, the raised subject *Mary* also has to move through all intervening XP domains, just like DP₂ (*which picture of himself*) does. Since the eventual landing site of *Mary* is higher than that of the matrix experiencer *to John*, there is no step of the derivation where DP₂ is in the vicinity of *John* (so that the reflexive in DP₂ can pick up *John* as its local antecedent) without *Mary* also being in the same minimal domain. Thus, *Mary* may never cease to be an intervener for a reflexivization dependency between *John* and *himself* in DP₂, which will then account for the illformedness of (50-b). To conclude, it is unclear whether English pit-stop reflexives can be taken to argue for punctuated paths versus uniform paths; nevertheless, this *type* of argument strikes us as fairly important in order to determine exactly how local a local modelling of non-local movement dependencies should be taken to be.

2.3.2. Local modelling: other dependencies

Two kinds of approaches can be distinguished with respect to the options of local modelling of non-local dependencies other than movement – i.e., reflexivization, case assignment, agreement, control, switch reference, consecutio temporum, etc. On the one hand, the idea has been pursued that such non-local dependencies can in fact be treated as *instances* of movement (albeit *abstract* instances, in many cases).¹⁴ On the other hand, attempts have been made to directly model

¹⁴ This is not to be confused with spurious non-locality approaches to some given dependency where it is postulated that the dependency is parasitic on an independently existing (although

such non-local dependencies in a local way that is independent from movement. (Needless to say, the latter kind of approach may sometimes resemble the former one, and the boundaries may be blurry in individual cases.)

2.3.2.1. Local modelling: reflexivization

There is a long tradition in Principles-and-Parameters-based work to treat long-distance reflexivization as an instance of abstract (covert, LF) movement. As noted by Büring (2005), these analyses come in two varieties: First, the displacement operation is often viewed as an instance of (successive-cyclic) *head movement* (see Pica (1987), Cole et al. (1990), Cole & Sung (1994), among many others); second, it may be considered an instance of *phrasal movement* (see, e.g., Huang & Tang (1992)). A well-known problem with the head movement approach is that head movement seems to be strictly local otherwise (see Travis (1984), Baker (1988)). A potential problem with the phrasal movement approach is that where reflexive pronouns must move overtly in the languages of the world, they typically do so via head movement (or cliticization).

In contrast to movement analyses, Kiss (2004) introduces an HPSG-style analysis that treats non-local reflexivization dependencies similarly to SLASH feature percolation approaches to movement dependencies (see also Kiss (this volume)). Once a reflexive dependency calling for resolution is introduced into a syntactic structure (analogously to rules like (45-a) and (46-a) that introduce traces), the relevant information is passed on as a feature (D(1)) (analogously to SLASH feature percolation as a foot or head feature), and projected from daughter to mother; and the dependency is ultimately resolved once an antecedent with the same index is locally found (analogously to filler-gap rules like (45-b) and (46-b)).

The minimalist approach developed by Fischer (2004; 2006) is a hybrid one, combining aspects of movement and feature percolation. The basic premise is that reflexivization involves an Agree operation involving antecedent and reflexive pronoun (also see Reuland (2001), Heinat (2006), Schäfer (2008; this volume)). However, Agree, by assumption, is only possible in extremely local domains because every XP qualifies as a phase. To make Agree (and thereby, reflexivization) possible, an abstract pronominal feature matrix generated in an argument position is moved locally, from phrase to phrase, until an appropriate antecedent is found. An interesting aspect of this proposal is that the more the pronominal matrix is frustrated by intermediate movement steps that do not yet

also often abstract) movement operation, as in the approach to LDA developed by Polinsky & Potsdam (2001) and others. In the approaches to be considered momentarily, the non-local dependency is *not fed* by a movement dependency; it either *is*, or is an *intrinsic part* of a movement dependency.

find an antecedent, the more likely it is that reflexive features of the matrix are deleted, which will then lead to a non-reflexive (i.e., purely pronominal) realization of the pronoun. Thus, as in Polinsky & Potsdam's (2001) analysis of LDA, movement precedes and enables agreement in Fischer's approach to reflexivization. However, one cannot say that reflexivization is parasitic on movement in this approach because the movement of the pronominal feature matrix is an intrinsic part of reflexivization, together with the final Agree operation (see footnote 14); the movement operation is not assumed to be independently motivated.

To conclude, in both Fischer's (2006) and Kiss's (2004) analyses, reflexivization may involve the passing on of relevant binding information in syntactic trees. A local modelling of (potentially) non-local anaphoric dependencies is involved.

2.3.2.2. Local modelling: case assignment

Phenomena involving long-distance ECM do not seem to have successfully been tackled on the basis of strictly local approaches. Phenomena involving global case marking (cf. (13)) have been locally modelled in the minimalist program in Béjar & Āezáč (2009), Keine (2010), and Georgi (2009) (also see Georgi (this volume)). Recall that the problem here is that case assignment of some verb to a DP depends not only on the ϕ - and definiteness-related properties of the DP itself (as in standard, local, cases of differential argument encoding), but also on the properties of another (typically co-argument) DP. In a local approach to case assignment, a classic dilemma will arise. First, there is the issue of look-ahead: The case of an internal argument may depend on properties of the external argument. However, given basic minimalist assumptions about structure-building, the external argument is not yet part of the structure when case needs to be assigned to the internal argument. If there is no look-ahead, case assignment to the internal argument therefore cannot take place *before* the external argument is merged. Second, there is the issue of backtracking: According to the Strict Cycle Condition (Chomsky (1973)), which is a fundamental principle of virtually all derivational approaches to syntax, an operation cannot solely affect a proper substructure of the currently existing syntactic structure. Therefore, case assignment to the internal argument also cannot take place *after* the external argument has been merged.

The main idea underlying the analysis in Béjar & Āezáč (2009) (also cf. Anagnostopoulou (2005)) is to postulate that *v* has to carry out Agree with both an internal and an external argument but may not sufficiently be specified with person features for both arguments; an atypical (first or second person) internal argument may require a special feature *P* on *v* which is responsible for a special case assignment to the internal argument. The analysis in Béjar & Āezáč

(2009) manages to avoid both problems, but only for a subset of the relevant phenomena; in a nutshell, the problem is that variation in the properties of the external argument cannot systematically be accounted for. In contrast, Keine's (2010) analysis, although basically local, turns out to exhibit remnants of non-locality on closer inspection. Here, v (or T) first carries out agreement with both arguments; then, impoverishment applies depending on the properties of both arguments; and finally, case assignment takes place, with differential argument encoding emerging as a side effect of impoverishment (see Keine & Müller (2008)). In this approach, the ultimate case assignment operation is local. However, it presupposes an earlier step where the ϕ -properties of *both* arguments are recorded on the agreeing head (v or T), and this would seem to qualify as a clear non-local residue. Finally, Georgi (2009) addresses global case marking in a local way by assuming that whether or not case is assigned to an internal argument by v (which may depend on ϕ -features of the object, and may also be optional in some languages) can determine what kinds of external arguments v can take.

2.3.2.3. Local modelling: agreement

As for instances of LDA (see (15)), next to various kinds of spurious non-locality analyses (see section 2.1.3) and genuine non-local modellings (see section 2.2.1), it has sometimes been argued that they should be modelled in a strictly local way, by what has become known as *cyclic Agree*. An early (non-minimalist) approach of this type is developed by Butt (1995). More recent minimalist approaches include Legate (2005), Keine (2008), Lahne (2008), and Preminger (2009) (Preminger in addition also makes use of the movement strategy discussed above as an instance of a spurious non-locality approach). Taking Legate (2005) as a representative example for a local modelling of LDA, it is interesting to note that at no stage of the derivation is there an Agree relation between the matrix verb and the embedded DP in this kind of approach. Rather, the DP's ϕ -features first value a $[u\phi]$ probe feature of a phase head, which by definition (cf. the PIC in (38)) is also part of the higher phase. The matrix verb then probes the embedded phase head's ϕ -features. Thus, the embedded phrase head acts as a hinge between the matrix and embedded domains. Such an approach straightforwardly accounts for the observation that LDA presupposes the existence of local agreement in the embedded clause. However, it is not entirely unproblematic from a theoretical point of view, given standard minimalist assumptions about probe features, goal features, and the Agree operation: It looks as though one and the same set of ϕ -features (on the phase head in the middle) must act as a probe in one case, and as a goal in another. It might also be worth noting that an alternative local analysis that mimicks SLASH feature percolation for movement dependencies might in principle be an option; but to the best of

our knowledge, such an analysis has not yet been proposed. See Richards (this volume) for extensive discussion.

2.3.2.4. Local modelling: control and switch reference

Similarly, local approaches to other non-local dependencies can be found in the literature. As far as control is concerned, it has been argued that control is but an instance of movement (see Hornstein (2001) and Boeckx & Hornstein (2006), among many others). On this view, to the extent that movement can be treated in a strictly local way, so can control, and there is virtually nothing more to say.

With respect to switch reference (see (21)), unlike the majority of work on these phenomena, Camacho (2010) does not employ a binding-theoretic approach. Rather, he suggests that agreement is involved. He reanalyzes the apparent non-locality of switch reference marking in terms of local cyclic agreement operations between the subjects of the two clauses on the one hand, and the case and ϕ -features on the C head of the clause in which the switch reference marker shows up, on the other hand. A same subject marker then indicates the presence of the case and ϕ -features, and a different subject marker signals the absence of these features. Another agreement-based approach to switch reference systems (based on tense agreement) is developed in Assmann (2012). In contrast, Georgi (2012) proposes that switch reference marking is an instance of (successive-cyclic) movement, and presents an analysis that treats the phenomenon on a par with the control-as-movement approaches just mentioned.

3. Issues

Given that it does not seem likely that approaches in terms of spurious non-locality will plausibly be extendable to capture all relevant kinds of non-local dependencies, and given that genuinely non-local approaches to non-local phenomena in syntax face certain conceptual and empirical problems, it seems unavoidable to postulate that at least some instances of non-local dependencies will have to be addressed by local modelling. Assuming this to be the case, a number of central questions arise concerning the *scope* of local modelling of non-local dependencies in syntax. First, given that a uniform theory of syntactic dependencies may be viewed as a desideratum, and given that some dependencies are to be viewed as strictly local, could it be that there are no non-local dependencies in syntax at all, and all dependencies are modelled strictly locally? If this question is answered to the affirmative, several further questions need to be addressed. An obvious next question then is whether all the different types of non-local dependencies are to be captured in essentially the same way (e.g., by postulating local

movement – possibly of abstract items – or local feature percolation throughout)? Third, it is obvious that there tend to be asymmetries between different kinds of (non-local) dependencies (e.g., displacement may often be non-local to a higher degree than reflexivization; different types of displacement may be non-local to a different degree from other types of displacement; and so on). How can such asymmetries be accounted for (both under an approach that treats all non-local dependencies in exactly the same local manner, and under an approach that treats them in different ways, albeit locally throughout)? Fourth, how can asymmetries between different languages with respect to the same kinds of (basically non-local) dependencies be accounted for? Fifth, what size should the syntactic domains be taken to have that provide the space for local suboperations (which in turn are combined to yield non-local dependencies)? Should they be as small as possible (such that even dependencies that may not look as non-local from a pre-theoretic point of view then emerge as non-local; see, e.g., Richards (this volume) on agreement; and also cf. Chomsky's (2007) remark that "phases should be as small as possible, to maximize the effects of [...] computational efficiency" (p. 17)); should they be as large as possible; or should the size be taken to vary, perhaps arbitrarily so?

In addition to these considerations, it is worth noting that different *syntactic theories* favour (or, indeed, require) local approaches to non-local dependencies to different degrees. Interestingly, this issue is independent of other, fundamental differences between syntactic theories, spanning, e.g., the generative-derivational/declarative-representational dichotomy. Thus, local modelling of non-local dependencies is an intrinsic feature of both *GPSG* and *HPSG*; e.g., none of the theoretical building blocks in Gazdar et al. (1985) involve non-locality (this holds for immediate dominance rules; principles regulating the distribution of syntactic features, like the Foot Feature Principle and the Control Agreement Principle; feature specification defaults; feature co-occurrence restrictions; linear precedence statements; and, last but not least, metarules, notwithstanding the computational complexity they have been shown to introduce in Uszkoreit & Peters (1986)).¹⁵ Similarly, in *categorial grammar* (see Moortgat (1988), Steedman (2001), Jäger (2005) for some versions) all syntactic restrictions are captured by (i) the complex properties of linguistic expressions, and (ii) a fairly small set of rules for combinations of the linguistic expressions, with no possibility to refer to widely separated linguistic expressions so as to model non-local dependencies in a non-local way. Finally, in more recent versions of the Principles-and-Parameters approach that have been developed

¹⁵ McCloskey (1988, 28, fn. 13) notes that "in early unpublished work, Gerald Gazdar discusses the possibility of using rules of the form $A \rightarrow [B [C D E]]$ while remaining within the context-free languages as far as weak generative capacity is concerned." This way, a (non-local) dependency involving A and D could be modelled non-locally in (early) GPSG. However, McCloskey then goes on to say that "such rules [...] have played no role in analytic practise as GPSG developed."

within the minimalist program, the syntactic *phase* is a central concept that effectively forces local modellings of non-local dependencies. This becomes even more obvious if one assumes that the PIC (see (38)) does not have to be stipulated as such, but is in fact derivable from assumptions about *cyclic spell-out* (see Uriagereka (1999) for the original idea, which however differs substantially from the form it takes in Chomsky's more recent work): On this view, once a phase is completed, the complement of the phase head is sent off (non-metaphorically) to the PF and LF interfaces, and material included in these spelled-out domains is simply not accessible anymore by subsequent syntactic operations (and that means, in higher parts of the syntactic structure). So, under this conception of phases, the only way to model a dependency correlating some item α in the complement domain of a phase and some other item β higher in the structure, is to locally pass on the relevant information associated with α via phase edges, until it becomes a phase-mate with β .

Thus, there is some convergence among several more recent syntactic theories (GPSG/HPSG, categorial grammar, minimalist program) to the effect that non-local dependencies are to be modelled locally.¹⁶ And indeed, we would like to contend that closer inspection often reveals that local analyses of non-local phenomena developed in different kinds of syntactic theories can be shown to not only share similar research questions, but also, to a large extent, similar research strategies (among them most prominently those that center around the issues concerning the scope of local modelling mentioned above). This, we believe, holds some promise for the further development of syntactic theory as a collaborative enterprise in the next couple of years, irrespective of (and, hopefully, largely orthogonal to) other differences pertaining to conceptual issues that separate the frameworks – such as (i) the question of whether an abstract or a surface-oriented approach should be pursued, (ii) questions related to the nature/nurture debate, (iii) questions concerning the degree of formalization required for theory construction, and (iv) the issue of how minimalist syntactic theory should be taken to be (and how big the role of ‘third-factor’ explanations should be assumed to be; see Chomsky (2005)).

The *contributions* to the present volume advance and discuss various kinds of local analyses of non-local dependencies in syntax from different theoretical points of view (minimalist program, HPSG, categorial grammar, and related – sometimes hybrid – approaches).¹⁷ Empirically, the focus is on those phenom-

¹⁶ This can be contrasted with other syntactic theories that permit (and, in many cases, systematically envisage) a non-local modelling of non-local dependencies (e.g., LFG, earlier versions of the Principles-and-Parameters paradigm like *Government-Binding* theory (see Chomsky (1981; 1982; 1986b)), and most versions of Optimality Theory (see, e.g., Grimshaw (1997), Legendre et al. (1998), Legendre et al. (2001), and Samek-Lodovici (2006) – but also cf. Heck & Müller (2003; 2007) for a strictly local version of optimality-theoretic syntax).

¹⁷ Many of the articles collected here ultimately go back to a workshop at the DGfS (*German Linguistics Society*) meeting at Bamberg University in 2008.

ena that have featured prominently in the present introduction. First, non-local agreement is tackled in the articles by Fabian Heck & Juan Cuartero; Artemis Alexiadou, Elena Anagnostopoulou, Gianina Iordăchioaia & Mihaela Marchis; Petr Biskup; and Marc Richards. Next, non-local reflexivization and binding are addressed in the papers by Tibor Kiss; Joachim Sabel; Daniel Hole; and Udo Klein, with the former two focussing on reflexivization and the latter two focussing on (semantic) binding. Third, the papers by Florian Schäfer and Doreen Georgi are concerned with non-local case assignment. After this third block, there are two papers on other, less widely addressed types of non-local dependencies: Non-local scope of negation is tackled in Hans-Martin Gärtner's article, and non-local (cyclic) deletion is at the core of Masaya Yoshida & Ángel Gallego's contribution. Finally, the remaining six papers are all about what is arguably the core instance of non-local dependencies in syntax: movement. They are (in that order) by Chiyo Nishida; Christina Unger; Klaus Abels & Kristine Bentzen; Chris Worth; Gregory Kobele; and Dalina Kallulli. In addition, several of the papers are not confined to a single non-local dependency but also address other dependencies; see, e.g., Schäfer on reflexivization, Worth on agreement, Abels & Bentzen on reflexivization and (semantic) binding, Kobele on binding, Biskup on movement, and Alexiadou, Anagnostopoulou, Iordăchioaia & Marchis on movement and control. This is just what one would expect, given that capturing similarities and differences among the various types of non-local dependencies forms an important part of current research in this area.

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