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# INTRANSITIVE *AND*: LOCALITY, MOVEMENT, AND INTERPRETATION[*]

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This paper provides a syntactic and semantic analysis of elliptical conjoined structures like those in (1).

(1) a. He can’t finish the paper… not and [$_{VP}$ get a full night’s sleep].
b. She made several remarks at the meeting… and [$_{DP}$ cogent ones] at that.
c. Joe went to the movies… and [$_{DP}$ Mary], too.
d. He’s eating a cheeseburger… and [$_{PP}$ on Shabbes]!

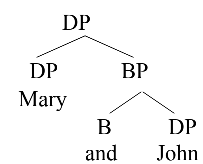
In section 1 we present an analysis of more straightforward conjoined phrases, based on that of Munn (1993), and briefly outline a semantic representation for *and*. In section 2 we discuss the scope-taking properties of *and*, showing the empirical difficulties faced by the theory developed by Munn. Section 3 presents our analysis of constructions like those in (1).

## 1. Basic properties of conjunction

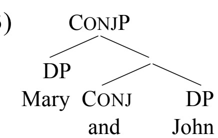
### 1.1 Syntax: *and* heads an adjunct

Munn (1993) argues that *and* heads a projection, which he calls Boolean Phrase (BP), that adjoins to another constituent, as in (2). He presents several arguments for (2), as opposed to his earlier (Munn 1987, 1992) Conjunction Phrase treatment shown in (3).

(2)




(3)




Munn shows that the adjoined structure accounts more adequately for binding asymmetries between the two conjuncts, as shown in (4).

(4) a. John$_i$ and his$_i$ dog were seen on the beach.
b. *His$_i$ dog and John$_i$ were seen on the beach.

It also correctly predicts that subcategorization and selection invariably pay attention to the category or semantic properties of the conjuncts rather than to the fact that the structure is conjoined. A phrase such as *Mary and John* thus patterns with other DP’s, not with other conjoined structures.

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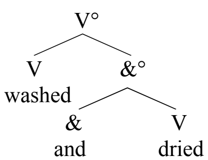
The adjoined structure also permits heterocategorial conjunction, as Munn points out. As is typical for adjuncts, the constraints on what category can appear as the complement in the Boolean phrase are semantic, as illustrated in (5).

(5) a. She was [$_{AP}$ tired] and [$_{PP}$ in a bad mood].
b. Fred is [$_{AP}$ creative] and [$_{DP}$ a wonderful teacher].
c. *A [$_{A(P)}$ tall] and [$_{A(P)}$ former] jump jockey was riding the horse.
d. *She was in [$_{DP}$ a blue funk] and [$_{DP}$ a red car].

We adopt the adjunction analysis of *and*, but have chosen to call the category &P, both for transparency and for consistency with the minimalist/bare phrase structure approach to syntactic categories, in which category labels are a relatively straightforward reflection of the lexical items heading them. In addition, we assume that not only full phrasal projections, but also heads, may appear with adjuncts headed by *and*. Sentences such as those in (6), with conjoined verbs, prepositions and complementizers, contain projections of & like the one in (7).

(6) a. Judith [$_V$ washed] and [$_V$ dried] the towels.
b. The events took place [$_P$ in] and [$_P$ around] Toronto
c. [$_C$ If] and [$_C$ when] she arrives, the party will begin.

(7)



This structure is consistent with Marantz's (1997) assumption that the same principles of composition govern phrasal, X°, and morphological structures, and with Béjar's (2000) argument that Merge applies to constituents as small as single features, creating non-phrasal constituents in the course of syntactic computation.

1.2 Semantics: always intersection

Semantically, we take *and* to denote a function that enables its complement to compose with a constituent of the same semantic type. While space prevents a thorough discussion of the denotation of *and*, we assume that it always has the effect of creating an intersection of two sets. When the complement of *and* is an ⟨e,t⟩ predicate, the intersection is relatively obvious, as in (8).

(8) Mary is tall and thin. [*tall*$_{\langle e,t\rangle}$ [*and thin*$_{\langle e,t\rangle}$]]$_{\langle e,t\rangle}$ is a predicate representing the intersection of *tall* and *thin*

When the complement of *and* is a DP, the semantics of the conjunction is often treated as set union (see Munn 1993 for one such treatment). However, if DP's are taken to denote generalized quantifiers, that is sets of sets (Montague 1974), then intersection can be used, as in (9).

(9) Mary and John are in the pool.

The denotation of *John and Mary* is the intersection of the set of sets containing John and the set of sets containing Mary. It is therefore the set of sets containing both John and Mary. What (9) means, then, is that the predicate *in the pool* is one of the sets that contain both John and Mary.

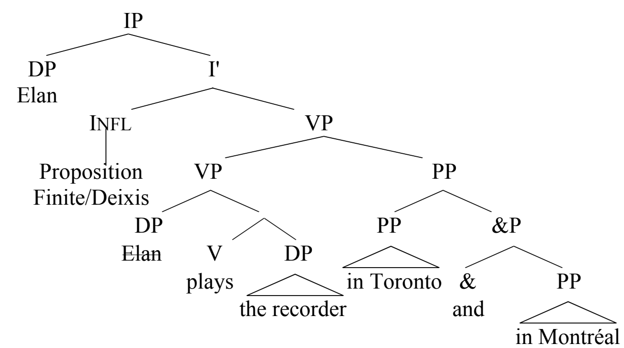


## 2. The scope of *and*

### 2.1 Syntactic and semantic hosts

The semantics of *and* is complicated by the long-recognized fact that conjunctions sometimes take scope over pieces of structure larger than the constituents they are in construction with. The structure that participates in semantic intersection—what we will call the **semantic host** of *and*—does not always correspond exactly to the **syntactic host** to which the &P is adjoined. A mismatch between the syntactic and semantic hosts of *and* may be seen in (10).

(10) Elan plays the recorder in Toronto and in Montréal.




If *in Toronto* and *in Montréal* intersect semantically at the level of PP, then we would expect the sentence to mean that Elan plays the recorder in a place that can be described as being both in Toronto and in Montréal. While this reading is semantically available, it is pragmatically dispreferred for the obvious reason that no such place exists. In order for the sentence to receive its most pragmatically sensible reading, semantic intersection must take place at the level of I', so as to include the tense and aspect encoded in INFL.[1] The different readings resulting from selecting PP, VP and I' as semantic hosts are characterized in (11).

(11) a. #PP: Elan habitually plays the recorder [at the intersection of in Toronto and in Montréal]
b. #VP: Elan habitually engages in an activity which can be described as [the intersection of playing the recorder in Toronto and playing the recorder in Montréal]
c. √I': Elan belongs to [the intersection of the set of people who habitually play the recorder in Toronto and the set of people who habitually play the recorder in Montréal]

[1]Here, we show INFL with the features it would contain under the theory of Cowper (1998) and Cowper and Hall (1999). The observation that the semantic host of *and* in this sentence must include information about tense and aspect is, however, independent of the way in which that information is encoded.

## 2.2 Upward locality constraints on interpretation

The semantic host of *and* can thus be higher than the syntactic host of &P. However, it appears that there are limits on how much higher it can be. Consider for example the range of possible interpretations for (12).

(12) The professor [$_{VP_2}$ gave a book to [$_{DP_3}$ the student who [$_{VP_1}$ handed in [$_{DP_2}$ her essay [$_{PP}$ about [$_{DP_1}$ James Joyce [$_{\&P}$ and Virginia Woolf]]]] before the deadline]]]].

(13) lists the results of selecting various semantic hosts for *and*.

(13) a. √$DP_1$: The essay was about two people: [Joyce and Woolf]
b. √PP: The essay had two topics: it was [about Joyce and about Woolf]
c. *$DP_2$: The student handed in two essays: [her essay about Joyce and her essay about Woolf]
d. *$VP_1$: The student performed two acts of handing in: she [handed in her essay about Joyce and handed in her essay about Woolf]
e. *$DP_3$: The professor gave a book to two students: [the one who handed in her essay about Joyce and the one who handed in her essay about Woolf]
f. *$VP_2$: The professor performed two acts of giving: she [gave a book to the student who handed in her essay about Joyce and gave a book to the student who handed in her essay about Woolf]

None of the readings in which the &P takes a semantic host as high as or higher than $DP_2$ is available, even though these readings are pragmatically plausible. There must therefore be some syntactic or semantic restriction on the scope of *and*. Munn (1993: 186), following May (1985), claims that "the scope of the conjunction is everything that the conjunction m-commands." In (12), this appears to make the right prediction, as the lowest maximal projection that fully contains the &P adjoined to $DP_1$ is the PP.

However, *and* sometimes takes wider scope than Munn predicts. The preferred reading of (10) has *and* taking scope over I', while the conjunction m-commands only VP. The same fact can be seen with clearer semantic effect in (14). While m-command is adequate in (14a), *and* must take wider scope in (14b).

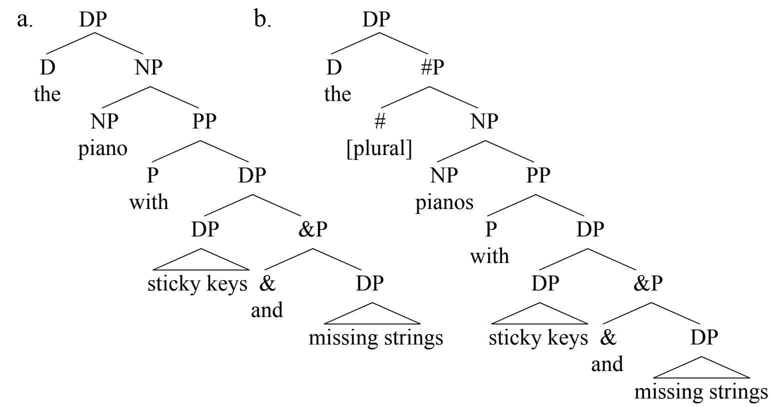
(14) a. Bill has played the piano with [sticky keys and missing strings].
b. Bill has played the pianos with [sticky keys and missing strings].

In (14a), the piano referred to must have both sticky keys and missing strings. In (14b), however, two readings are possible: either each piano has both sticky keys and missing strings, or each has at least one of these deficiencies.

Munn's theory predicts that in each of the structures in (15), *and* has scope over the PP headed by *with*.



(15)




In each sentence, the PP denotes a predicate that intersectively modifies the predicate *piano*. If *and* takes scope over the PP, the NP will denote ⟦*piano*⟧ ∩ (⟦*with sticky keys*⟧ ∩ ⟦*with missing strings*⟧). This results in the correct reading of (14a) and one possible reading of (14b), but it does not allow for the reading of (14b) in which each piano need have only one of the two properties. This reading can, however, be generated if *and* is permitted to take scope over the #P (Ritter 1991) in (15b).

Suppose, following Carlson's (1977) treatment of bare plurals, that plural number composes with NP to turn a predicate into a generalized quantifier corresponding to a set of individuals. The #P *pianos*, for example, would denote the set of sets to which 'pianos' belong; pending further specification by a determiner, this #P could be interpreted in any of the three ways shown in (16).

(16) a. **Existential**: the set of sets to which some pianos belong
John keeps pianos in his garage.
=There are some pianos that have the property of being kept in John's garage.
b. **Universal**: the set of sets to which all pianos belong
Pianos are musical instruments.
=Being a musical instrument is a property of all pianos.
c. **Generic**: the set of sets to which pianos in general belong
Pianos have 88 keys.
=Having 88 keys is a property of pianos in general, although there can be individual exceptions.

If #P is taken as the semantic host of *and* in (15b), the result is the intersection of two sets of sets. One is the set of those sets containing pianos with sticky keys, and the other is the set of those sets containing pianos with missing strings. The intersection of these is the set of sets to which belong pianos with sticky keys and pianos with missing strings. With the addition of the definite determiner, the DP denotes a generalized quantifier corresponding to the contextually salient subset (Heim & Kratzer 1998: 81) of [pianos with sticky keys and pianos with missing strings]. Each piano in this set has at least one of the specified properties.

In (14b), then, *and* must be able to take scope over a larger structure than it m-commands. Specifically, it must be able to take scope over the #P, but it need not be able to have scope over the whole DP. In (12), the head of an &P adjoined to a DP could take scope over anything below the next DP up. The scope of *and* thus appears not to be defined by m-command, but rather to be restricted by the presence of DP. Based on these data, we draw the generalization in (17):

(17) If the syntactic host of &P is dominated by a DP, the semantic host of *and* must also be dominated by the same DP.

In (15b), the syntactic host of &P, *sticky keys*, is dominated by the higher DP. The semantic host of *and* must also be dominated by that DP. If the semantic host is the lower DP, the PP, or the NP, then the result will be intersective predicate modification, and the larger DP will refer to the set of pianos with both sticky keys and missing strings. If the semantic host is #P, then the intersection will be between two generalized quantifiers, and the larger DP will refer to the set of pianos with one or both properties.

So far, we have seen that the search for a semantic host for *and* is blocked by DP, but not by PP or #P (12, 14b), nor by VP or I' (11). Additional evidence suggests that IP also limits the scope of *and*. Consider the sentences in (18).

(18) a. The band is playing tomorrow at eight.
b. The band is playing right now.
c. The band is playing right now and tomorrow at eight.

In (18a), the present progressive has a futurate interpretation effected by dissociation of the temporal structure of the present progressive INFL from the futurate time reference of the VP containing the adverbial *tomorrow at eight*. The sentence means ‘It is a current and ongoing property of the band that they play tomorrow at eight.’ The VP denotes a futurate event (‘the band play tomorrow at eight’), while the present progressive semantics of INFL applies to the relation between that event and the raised subject in spec/IP.

In (18b), the futurate reading is available but not obligatory, because *right now*, unlike *tomorrow at eight*, is semantically compatible with present tense. The sentence can mean either that the band is in the process of playing, or that the band is about to start playing. The futurate reading involves the same dissociation of INFL from VP as in (18a); the non-futurate reading has no such dissociation.

When both adverbial phrases are present, as in (18c), the non-futurate reading of *playing right now* is no longer available. This follows if I', but not IP, is available as a semantic host for *and*:

(19) a. √I': It is a current and ongoing property of the band that they are to play immediately and to play tomorrow at eight.
b. *IP: The band is currently in the process of playing, and it is a current and ongoing property of the band that they play tomorrow at eight.

If only I' and not IP is taken as the semantic host of *and*, then a single relation must hold between the raised subject and the two semantic realizations of I'. Dissociation of INFL from VP applies to both or to neither; in the case of (18c), the latter possibility is excluded by the futurate *tomorrow at eight*.

We can now amend the generalization in (17) to include IP as well as DP:



(20) If the syntactic host of &P is dominated by a DP or IP, the semantic host of *and* must also be dominated by the same DP or IP.

Our identification of DP and IP as the relevant categories is based entirely on empirical evidence; as of this writing, we have no theoretical explanation for it. However, it is worth recalling that NP and S (now DP and IP) were defined as potential governing categories for the binding theory (Chomsky 1981: 188) and, as cyclic categories, served as bounding nodes for the subjacency condition (Chomsky 1973, 1981, *inter alia*). In addition, DP and IP have semantic properties in common—such as the potential for definiteness—that may be relevant to their scope-limiting behaviour.

## 3. IP-adjoined &P’s

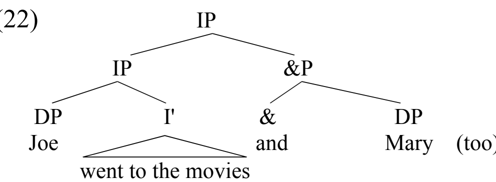
### 3.1 The phenomenon in general

We now turn to the sentences with which we began, repeated here in (21).

(21) a. He can’t finish the paper… not and [$_{\text{VP}}$ get a full night’s sleep].
b. She made several remarks at the meeting… and [$_{\text{DP}}$ cogent ones] at that.
c. Joe went to the movies… and [$_{\text{DP}}$ Mary], too.
d. He’s eating a cheeseburger… and [$_{\text{PP}}$ on Shabbes]!

The &P’s in these sentences are adjoined to IP, as shown in (22).

(22)




The semantic host of *and* in each of these cases, however, is not the full IP. In (21a), the VP *get a full night’s sleep* takes as its semantic host the VP *finish the paper*, and the interpretation, as usual, is the intersection of the two predicates. The sentence does not mean ‘He can’t finish the paper and he can’t get a full night’s sleep’; *and* cannot have scope over the negation.

In (21b), the DP *cogent ones* acts like a predicate. Since *ones* does not contribute to the semantic interpretation, the adjectival predicate *cogent* intersectively modifies the nominal predicate *remark*. In (21c), the generalized quantifier *Mary* intersects with the generalized quantifier *Joe*, giving the set of sets that both Mary and Joe belong to. The sentence thus asserts that the predicate (or set) *going to the movies* is one of the sets to which both Mary and Joe belong. In (21d), the predicate *on Shabbes* takes the event as its semantic host, and restricts the time of the event as an ordinary temporal modifier would. In general, then, it seems that the syntactic complement of *and* in such sentences finds a type-compatible semantic host within the IP to which the &P is adjoined.

### 3.2 Downward locality constraints on interpretation

In section 2.2 we saw that there are restrictions on the upward search for a semantic host for *and* when an &P is adjoined to a constituent dominated by a DP or an IP. In elliptical conjoined structures such as those in (21), there appear to be restrictions on the downward search for a semantic host within IP. For example, *ugly* in (23) can modify the NP headed by *man* (interpretation a), but not the NP headed by *hat* (interpretation b).

(23) [IP I met [DP a man who was wearing a cowboy hat] on my way to work]… and an ugly one at that.
 a. → The man is ugly.
 b. *→ The cowboy hat is ugly.

In (24a), with the phrase *a man in a cowboy hat* in object position, either the man or the cowboy hat may be ugly; in (24b), where the phrase appears in subject position, *ugly* can be predicated only of *the man*.

(24) a. I saw a man in a cowboy hat… and an ugly one at that.
 b. A man in a cowboy hat accosted me… and an ugly one at that.

A semantic host can be found inside a clause embedded within the IP to which &P is adjoined, as in (25), provided that the embedded clause is neither a wh-clause, as in (26), nor an adjunct, as in (27).

(25) a. She tried [to give a book to her mother] for weeks… and a long one, too.
 b. She believes [that her father deserves a medal] with all her heart… and a gold one at that.
 c. She has known [that I write novels] for years… and boring ones at that.

(26) a. *She has wondered [whether I write novels] for years… and boring ones at that.
 b. *She has known [why her father drinks beer] since she was a child… and homebrew at that.

(27) a. He has to get a phone before I'll talk to him… and a digital one at that.
 b. *Since he finally got a phone I'll talk to him… and a digital one at that.
 c. *If Mary gets a job we can go on vacation… and a well-paid one at that.

While the semantic host for *and* can sometimes be in a clause embedded in the IP to which &P is adjoined, it is not the case that all constituents in that IP can serve as semantic hosts. (28) shows that the inner object in a double object construction cannot.

(28) a. I told a story to a child… and a funny one at that.
 b. *I told a child a story… and a well-behaved one at that.

The patterns that emerge from (23)–(28) are summarized in (29).

(29)

| May properly contain the semantic host of *and* | May not properly contain the semantic host of *and* |
|---|---|
| simple noun phrases (23a) | complex noun phrases (23b) |
| objects (24a) | subjects (24b) |
| declarative complements (25) | wh-island complements (26) |
| argument clauses (25) | adjunct clauses (27b-c) |
| direct objects (28a) | inner objects (28b) |

The asymmetries in (29) are standard diagnostics for A'-movement (Chomsky 1977). A constituent is available as a semantic host for an IP-adjoined &P only if that constituent is in a position from which A'-movement to that IP is possible. The data in (30) show that the possibility of A'-movement correlates with the possibility of serving as the semantic host of an IP-adjoined &P.



(30) a. What did you see a man in t?
 b. *What did a man in t accost you?
 c. What did she try to give t to her mother for two weeks?
 d. What does she believe her father deserves t with all her heart?
 e. What has she known that her father writes t for years?
 f. *What has she wondered whether I write t for years?
 g. *What has she known why her father drinks t for years?
 h. What does he have to buy t before I'll talk to him?
 i. *What because he finally bought t will you talk to him?/*What will you talk to him because he finally bought t?
 j. *What if Mary gets t can we go on vacation?/*What can we go on vacation if Mary gets t?
 k. What did you tell t to a child?
 l. *Who(m) did you tell t a story?

Somehow, then, the relation between the surface position of an IP-adjoined &P and the semantic host of *and* must result from, or have all the relevant properties of, A'-movement. Effectively, this means that there must be an A'-chain whose head is adjoined to IP and whose tail is the sister of the semantic host. Under current derivational assumptions, &P must therefore have merged in the position of the tail, and undergone overt syntactic movement to IP. Note that unless further complications are introduced, this overt movement is to the right. A theory incorporating Kayne's (1994) Linear Correspondence Axiom will thus require a multi-step movement analysis. More representational approaches could achieve the same result by allowing the semantic representation to include an inserted or independently generated trace as the sister of the semantic host.

Evidence of movement lends further support to the position that *and* heads a phrase adjoined to the first conjunct rather than a CONJP with the first conjunct as its specifier. Under the latter analysis, movement of *and* together with the second conjunct would be impossible.

### 3.3 Interaction between upward and downward locality constraints

We have seen that the interpretation of sentences with &P's is subject to two different sorts of locality constraints. It is possible to construct examples to which both sets of constraints can be seen to apply. Consider the sentences in (31).

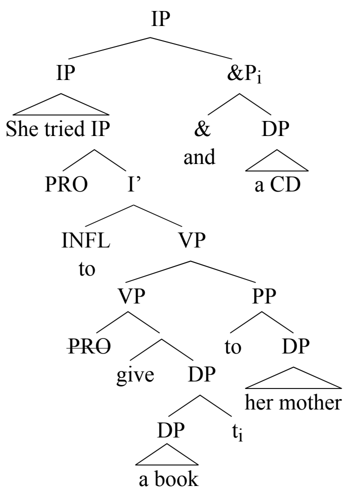
(31) a. Elan plays recorder in Toronto with his friends… and in Montréal, too.
 b. Elan plays recorder in Toronto and in Montréal with his friends.

These sentences are semantically equivalent. In each, the PP *in Montréal* is syntactically and semantically parallel to *in Toronto*, but the semantic host of the &P must be I'. Thus the &P in (31a) is interpreted as if it were adjoined to the PP *in Toronto*, and it takes a semantic host accessible from that position. As we saw earlier, the semantic host of *and* in (31b) cannot be higher than I'. *And* thus takes scope over a smaller structure than the IP to which the head of the chain is adjoined, but a larger structure than the constituent to which the tail is adjoined.

Another example of the interaction between upward and downward locality constraints may be seen in (32), whose structure is shown in (33).

(32) [$_{IP}$ She tried [$_{IP}$ to give [$_{DP}$ a book] to her mother]] for two weeks…[$_{\&P}$ and [$_{DP}$ a CD], too]].
=There was a 2-week period during which she tried to give her mother a book and a CD.
≠There was a 2-week period during which she tried to give her mother a book, and a 2-week period during which she tried to give her mother a CD.

(33)




As shown by the unavailability of the second paraphrase, the higher I' cannot be a semantic host for an &P adjoined to the matrix IP. This fact cannot be attributed to constraints on syntactic movement of the &P. Since the DP *a book*, deeply embedded within the I', can be a semantic host, it must be possible for the &P to merge as a sister of *a book*, and move to adjoin to the matrix IP. The possibility of movement is confirmed by the grammaticality of (34).

(34) What did she try to give t to her mother for two weeks?

The relevant constraint must therefore be the scope-limiting property of the lower IP. This property prevents selection of the higher I' as a semantic host in the semantically equivalent (35), in which the &P remains in its merge position.

(35) She tried [$_{IP}$ to give [$_{DP}$ a book [$_{\&P}$ and [$_{DP}$ a CD]]] to her mother]] for two weeks.

The fact that (32) and (35) are synonymous shows that moved &P's are interpreted in their merge position, with scope subject only to upward locality conditions. What we have called downward locality has no bearing on the interpretation of these &P's; it merely reflects restrictions on A'-movement.



## 4. Conclusions

Our examination of IP-adjoined &P's has yielded new insights into the semantic and syntactic properties of conjoined structures. We have provided additional support for Munn's (1993) analysis of *and* as the head of a monadic projection adjoined to the first 'conjunct,' rather than as the head of a dyadic CONJP whose specifier is the first conjunct. Contrary to Munn, however, we have demonstrated that the semantic scope of *and* is not simply its m-command domain. Rather, it is potentially much larger, and limited only by the presence of a dominating IP or DP. We have extended this analysis to account for dislocated &P's adjoined to a matrix IP, arguing that these &P's undergo rightward syntactic movement. The movement of &P is constrained by familiar restrictions on A'-movement, while the interpretation proceeds as if movement had not taken place. Given that &P's are predicates, and that it has been argued (Cinque 1984, Barss 1986, 1988, Carnie 1995, 1996, Legate 1997) that predicates obligatorily reconstruct, it is not surprising that they are interpreted *in situ*. The scope of the tail of an &P chain is subject to the same limitations as that of an unmoved &P.

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Basic Properties of Turing-recognizable Languages. 152. Theorem A Let A, B also languages 1. * \ A, 2. A B, and 3. A B.Â  The following three-tape TM MU recognizes U. 1. First MU checks that the input cw in tape 1 contains a legal encoding c of a Turing machine. If not, MU rejects the input. 2. Otherwise w = a1a2â€¦ ak { 0, 1 }* is copied to tape 2 in the form 00010a1+110a2+11 â€¦ 10ak+110000. 3. Now MU has to find out whether the TM M (c = M ) would accept w. Tape 1 contains the description c of M, tape 2 simulates the tape of M, and tape 3 keeps track of the state of the TM M: qi ~ 0i+1. Department of Software Systems. OHJ-2306 Introduction to Theoretical Computer Science, Fall 2011.