

## **Toward a Unified Theory of Argument Structure and Grammatical Function Changing Morphology**

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### **I. Introduction**

The traditional view of argument structure is roughly as follows: predicates merge directly with arguments to form larger constituents of the same category (VP, AP, PP, etc.). Each time merge applies a c-selection feature and/or  $\theta$ -role requirement of the predicate is satisfied. Such theories are closely related to the Fregean view that a predicate is an unsaturated expression. Similarly, modifiers, though generally assumed to be added “outside” the maximal projection of a head and its arguments, are still projections of that same category. Despite its successes, this approach is still empirically deficient in many respects. At the same time, it is not sufficiently general enough to incorporate well-known descriptive generalizations concerning thematic structure or to deal in a unified fashion with languages in which argument structure is expressed by means of grammatical function changing morphology on the verbal root.

I propose in this paper a radically different view according to which both arguments and modifiers are introduced within functional categories of different thematic “flavors” according to a fixed universal order. A predicate, in such a theory, simply denotes a set of events; arguments and modifiers are introduced by functional categories to provide further information about the relation between entities of various kinds and the set of events denoted by the predicate. There is thus no essential difference between arguments, quasi-arguments such as instrumentals, benefactives, etc., and modifiers apart from the fact that arguments are more frequently obligatory and tend to have structural rather than inherent Case.

I propose further that the notions ‘subject’ and ‘object’ arise entirely as a consequence of the Agree relation and the OCC (EPP) feature associated with the functional categories T(ense) and Voi(ce), respectively. Agree is a syntactic relation requiring that the uninterpretable  $\phi$ -features of some category F (the ‘probe’) be eliminated by establishing an agreement relation with a nominal expression with matching interpretable features (the ‘goal’) that is c-commanded by F. Agree values and deletes the uninterpretable structural Case feature of the goal at the same time.

I first lay out the assumptions of the theory and illustrate how it works. I then provide empirical support for the theory by showing: (1) that it solves the longstanding problem of relating the subject of active sentences to the object of the passive ‘by-phrase’; (2) that it provides a simple, straightforward analysis of the double object construction in English, as well as providing a structural account of many of the generalizations revolving around the notion ‘thematic role’ found in the work of Gruber, Jackendoff and others; and (3)

that it provides a simple and compelling explanation of the fact that in many languages grammatical functions (in a broad sense) are expressed by means of morphological affixes on verbal roots.

## II. The Theory

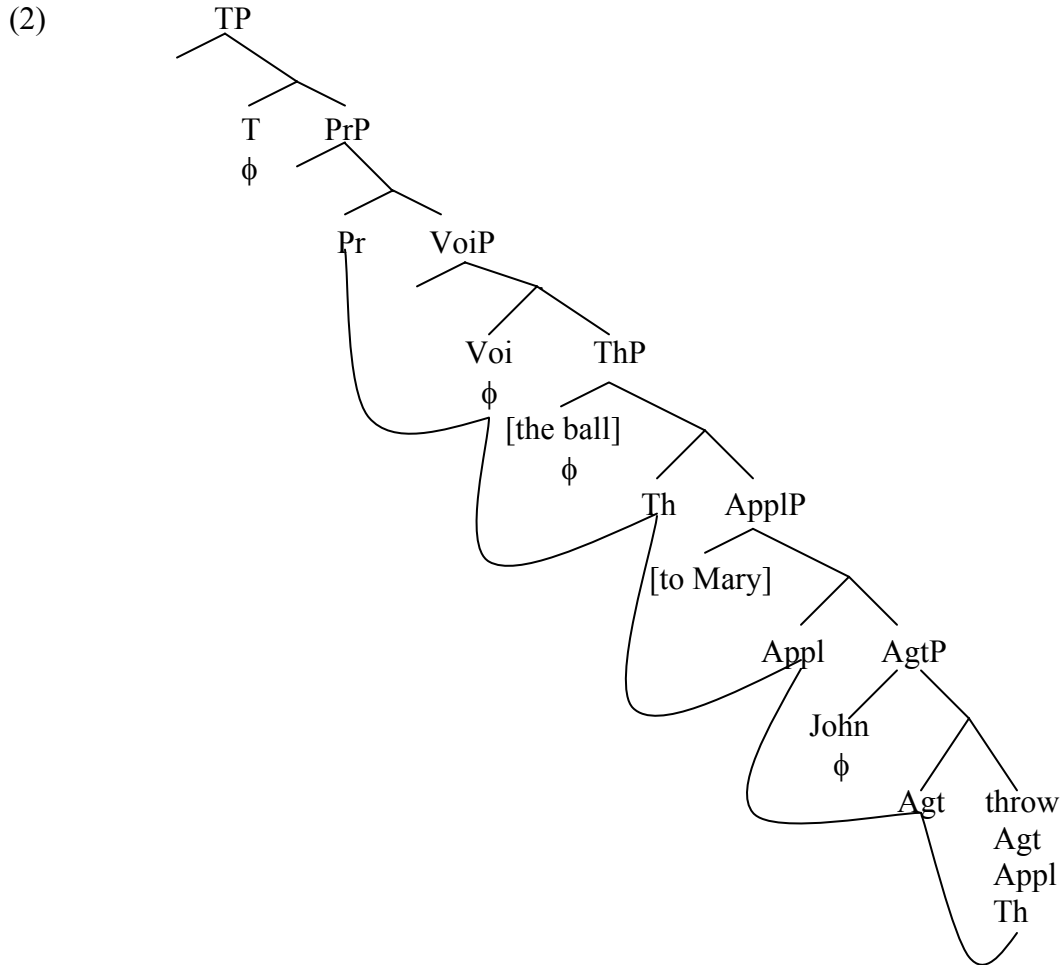
Lexicon: Contains (i) roots belonging to lexical the categories V, A, P, N; (ii) ‘light verb’ morphemes (often phonetically null) with thematic and functional features of various kinds, including those traditionally classified as ‘arguments’, e.g. [Agt], [Th], [Goal], [Source], [Appl], etc.; ‘quasi-arguments’, e.g. [Instr], [Ben], [Purpose], etc.; modifiers, e.g. [Manner], [Time], [Place], [Purpose], etc.; and more familiar ‘functional’ categories such as [Voice], [Pr], [T], [C], etc.

Derivation: Every light verb undergoes first merge with the projection of another light verb or with a lexical root and second merge with a phrase of an appropriate syntactic category. The lowest element is always a lexical root. The highest functional category in sentences is C, T (in ‘defective’ complements), or Pr (in SCs). Merge applies freely, constrained only by the selection properties of roots and functional categories, and by the following universal hierarchy of projections:

### (1) Universal Hierarchy of Projections (UHP):

C > T > Pr > Voi > Th > Source > Goal/Appl > Instr > Ben > Agt > Manner > Time >  
Place > Purpose > Root (V)

Every root contains a set of *thematic selection features*: [Agt], [Appl], [Th], etc., which are checked by adjoining the root (or the root plus whatever light verb heads it has previously adjoined to) to the light verb head containing that feature. The light verbs in turn contain c-selection features of the usual sort that are satisfied by merging constituents of the appropriate category in their specifier positions. For example, the light verb Appl in the example below has the c-selection feature [<sub>top</sub>], while Th and Agt have the c-selection feature [D]:



In cases where a root requires an argument of a specific category, or, even more restrictively, an argument headed by a specific LI of a given category, the thematic selection feature of the root must also have a c-selection feature associated with it. For example, the verb *look* contains the following thematic selection feature and associated c-selection feature:  $\{[Th], [at_p]\}$ . In such a case, both features are checked when *look* adjoins to the light verb Th with its associated c-selection feature  $[at_p]$ . In cases where the range of possible c-selection features is constrained only by the light verb itself, no c-selection feature need be specified in the lexical root. For example, Agt in English quite generally selects either D or *by<sub>p</sub>*. Hence a c-selection feature need only accompany the thematic feature  $[Agt]$  for all but a tiny number of English verbal roots. I assume that thematic heads may be LIs, morphemes, or phonetically null. If a morpheme is marked as a suffix, then head adjunction applies on the right; if it is marked as a prefix, then head adjunction applies on the left.

The existence of subjects and objects arises simply and solely from the fact that there are just two categories in natural language, T and Voi(ce), that contain probes. A *probe* is a set of uninterpretable  $\phi$ -features that are valued and deleted by establishing an Agree relation with a *goal* containing matching interpretable  $\phi$ -features and an uninterpretable structural Case feature, which is also valued and deleted by the Agree operation. In

English, Voi and T also contain an uninterpretable c-selection feature (the so-called EPP or OCC feature) which can only be satisfied by merging an occurrence of some previously formed constituent in the specifier position. Following Chomsky (2000, 2001), I assume that Move = Agree+OCC is a composite operation in the sense that its OCC feature must be satisfied as soon as the Agree relation is established. However, I follow Collins (1997), Bowers (2002), and others, in assuming that an OCC feature associated with Agree does not necessarily have to be satisfied by moving the same constituent with which the probe establishes the Agree relation to its specifier. Rather, the OCC feature of a head H must be satisfied either by moving the closest constituent of the required category that H c-commands or by merging an expletive with H.

I assume that Agree is constrained by a standard minimalist locality condition of the following sort (Chomsky 2000):

(3) Locality Condition (LC):

Suppose P is a probe and G is goal. Then Agree holds between P and G just in case G is the closest set of features in the domain D(P) of P that match those of P. The domain D(P) of P is the sister of D, and G is *closest to P* if there is no G' matching P such that G is in D(G').

Certain categories, such as Pr and passive Voi, may have a “pure” OCC feature, i.e. one that is unaccompanied by  $\phi$ -features. A pure OCC feature is also a kind of probe searching for a goal with matching categorial features. Crucially, however, a pure OCC probe is not subject to the LC, or at least is subject to a much weaker kind of locality condition. Hence it can be satisfied by merging in its specifier an occurrence of any non-frozen constituent of the appropriate category that it c-commands.

Both Agree and pure OCC, on the other hand, are governed by the following generalized and relativized version of Chomsky (2001)'s *Phase Impenetrability Condition* (PIC):

(4) Relativized Phase Impenetrability Condition (RPIC):

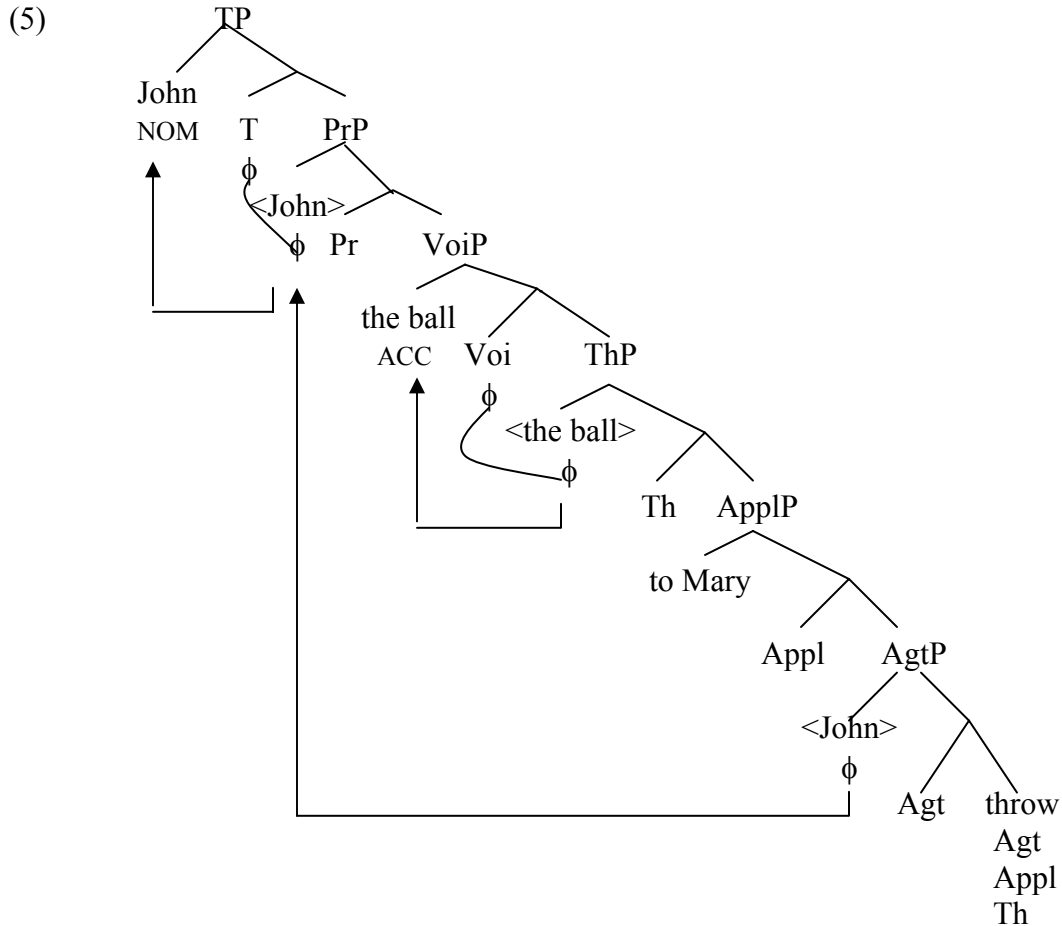
Let P be a probe of a given type (either  $\phi$ +OCC or pure OCC) that has been valued at some stage of the derivation and suppose that P' is the next probe of the same type to be introduced into the derivation. Then P' is barred from searching for a matching goal within the c-command domain of P.

The effect of the RPIC, as will be illustrated shortly, is to restrict the search space of the probes in such a way that once an Agree or pure OCC relation has been established, the c-command domain of the head containing the probe is no longer accessible to a probe of the same type introduced later in the derivation. Crucially, however, Agree and pure OCC are orthogonal to one another in the sense that establishing an Agree relation between a probe P and a goal G does not prevent a pure OCC probe P' from searching for a goal within the c-command domain of P, or vice-versa.

A DP with an unvalued Case-feature is said to be “active”, while one whose structural Case-feature has been valued and deleted is said to be “frozen.” Once a DP is frozen, it

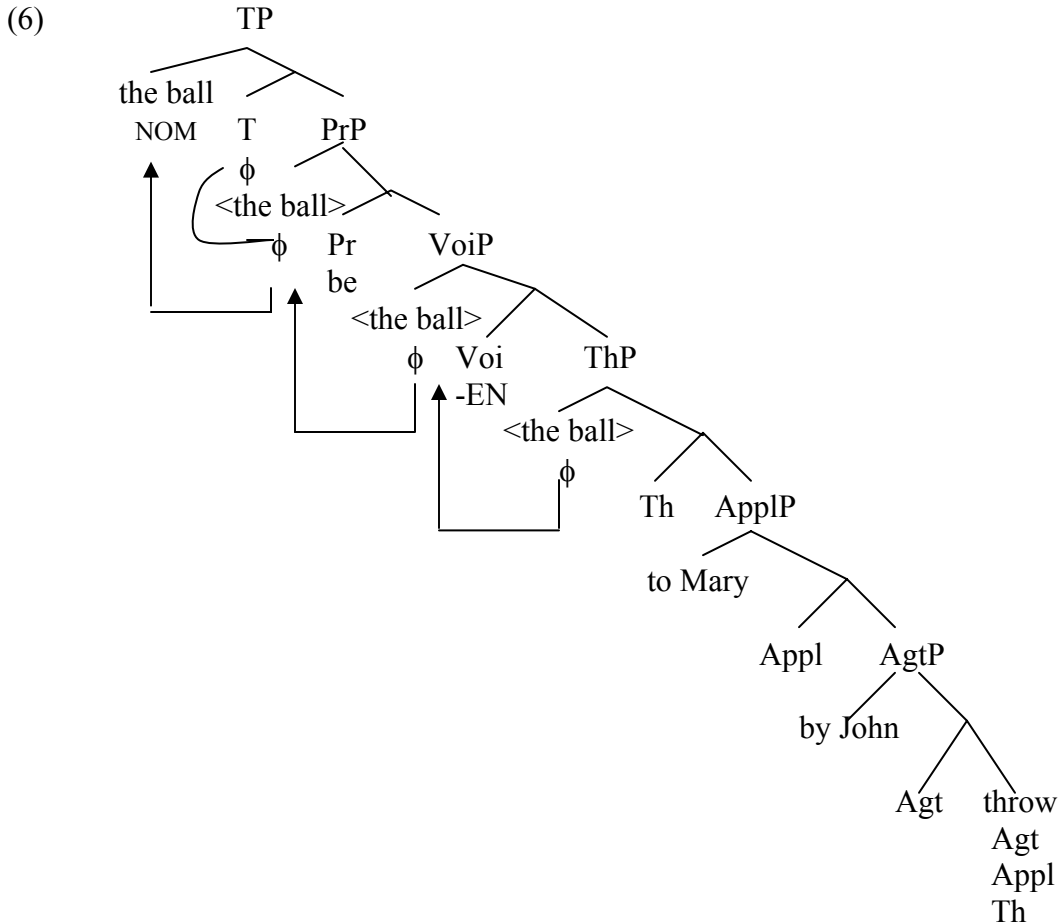
cannot move again or enter into another Agree relation (Chomsky 2000). I assume that inherently Caseless DPs are also frozen.

Let us see now how these assumptions work together to derive a transitive sentence such as example (1):



By the LC, the probe in Voi must first establish an Agree relation with the Theme DP *the ball*, the nearest potential goal, and value its Case feature ACC, after which it immediately moves *the ball* to [Spec, Voi]. By the RPIC, the Agent DP *John* is now inaccessible to the new probe in T. However, nothing prevents the Agt-phrase from first “escaping” to [Spec, Pr] to satisfy its ‘pure’ OCC feature, after which it can enter into an Agree relation with the probe in T, be assigned NOM Case, and move to [Spec, T].

Consider next the derivation of the passive sentence *the ball was thrown to Mary by John*:



As was mentioned earlier, an Agt-phrase may be realized either as a DP with an active structural Case feature or as a PP headed by *by* (in which case the Agent DP *John* is assigned inherent Case). If the latter option is chosen, then the only way to prevent the derivation from crashing is to suppress the  $\phi$ -features of Voi, since otherwise there will be an extra probe whose  $\phi$ -features will have no way of getting valued. This can be done in English by selecting the copula *be* in Pr, together with the passive value of Voi, which is lexically realized in English by the past participial morpheme *-EN*. Since the only active DP is the Theme-DP *the ball*, it must move first to [Spec, Voi] to satisfy the OCC feature of Voi, then to [Spec, Pr] to satisfy its OCC feature. (For derivations in which elements other than the Theme are merged in [Spec, Voi], see Appendix I.) Note that no other constituents such as *to Mary* or *by John* can be moved over *the ball* into [Spec, Pr] because they are rendered inaccessible by the RPIC. At this point the Case feature of *the ball* can be valued NOM by the probe in T and moved to [Spec, T].

Note that in this theory there is no need for either “Case absorption” or “ $\theta$ -role transfer.” The effect of the former falls out of the Agree relation together with the fact that passive voice in English does not contain  $\phi$ -features. The latter is unnecessary because the subject of an active sentence and the Agent of a passive sentence derive from the same structural position, where they are assigned a  $\theta$ -role directly.

### III. Empirical Arguments

#### A. *The problem of the passive by-phrase*

Turning now to empirical arguments in support of such a system, consider first the still unsolved problem of the passive *by*-phrase. Since the earliest days, the major defect in generative treatments of the passive has been their inability to derive the subjects of actives and the agents of passives from the same syntactic position. The theory proposed here solves this problem in optimal fashion by deriving the agent of both active and passive sentences *from the same position*, namely, [Spec, Agt]. The only difference between the two is that the Agent of a transitive sentence is an active DP with a structural Case feature that must be valued through the Agree relation, whereas the Agent of a passive is assigned inherent Case by the preposition *by*. (Alternatively, *by* might simply be an inherent Case marker.) The third possibility is that the Agt-phrase is realized by the null ‘arbitrary’ pronominal element  $PRO_{arb}$ . I assume that  $PRO_{arb}$  is inherently Caseless, hence is frozen in position in AgtP. In all three cases, then, the Agent of a transitive verb derives from the same structural position.

It might be objected that passive *by* is a purely grammatical formative with no semantic content. This, however, is not quite true. Though *by* imposes very few semantic constraints on its object, it is clearly not a pure non- $\theta$  position. This is shown by the fact that neither expletives nor parts of idioms can appear in a passive *by*-phrase:

- (7) a. It rained on the spectators.  
 b. The spectators were rained on (\*by it).
- (8) a. It annoyed Harry that Bill had left.  
 b. Harry was annoyed (\*by it) that John had left.
- (9) a. Bill kicked the bucket. (both idiomatic and literal reading)  
 b. The bucket was kicked by Bill. (literal reading only)
- (10) a. The shit hit the fan today. (both idiomatic and literal reading)  
 b. The fan was hit by the shit today. (literal reading only)

The fact that passive *by* is not completely lacking in content argues against any attempt (Collins 2004, for example) to derive both the subjects of actives and the agent of the passive from a pure non-theta position such as [Spec,  $v$ ].

More importantly, a wide range of facts robustly supports the claim of this analysis that the passive *by*-phrase is c-commanded by both Theme phrases and Applicative phrases, as well as by Source, Goal, Instrumental and Benefactive phrases.

1. Condition C effects (very robust, as expected):

- (11) a. \*The books were given to him<sub>i</sub> by John<sub>i</sub>.

- b. \*Mary was shown him<sub>i</sub> by John<sub>i</sub>.
- c. \*The books were thrown at them<sub>i</sub> by the men<sub>i</sub>.
- d. \*The package was received from her<sub>i</sub> by Mary<sub>i</sub>.
- e. \*The gangster was hit with him<sub>i</sub> by Superman<sub>i</sub>. (cf. Superman hit the gangster with himself (as he was hurtling through the air.)
- f. \*A present was bought for her<sub>i</sub> by Mary<sub>i</sub>.

2. Condition B effects (slightly weaker, as expected, and complicated by the fact that pronouns in passive *by*-phrase are only good in special contexts):

- (12) a. \*The books were given to John<sub>i</sub> by him<sub>i</sub>.
- b. \*Mary was shown John<sub>i</sub> by him<sub>i</sub>.
- c. \*The books were thrown at the men<sub>i</sub> by them<sub>i</sub>.
- d. \*The package was received from Mary<sub>i</sub> by her<sub>i</sub>.
- e. \*Mary was hit with Superman<sub>i</sub> by him<sub>i</sub>.
- f. \*A present was bought for Mary<sub>i</sub> by her<sub>i</sub>.

[NB: under the analysis of Collins 2004, the data in (11) must be treated as Condition B effects and that in (14) as Condition C effects, which seems intuitively wrong.]

3. Condition A effects (generally best when anaphor in *by*-phrase is contrastive):

- (13) a. The books were given to John<sub>i</sub> by himself<sub>i</sub>.
  - b. Mary was shown John<sub>i</sub> by himself<sub>i</sub>.
  - c. The books were thrown at the men<sub>i</sub> by each other<sub>i</sub>.
  - d. The package was received from Mary<sub>i</sub> by herself<sub>i</sub>.
  - e. Mary was hit with Supoerman<sub>i</sub> by himself<sub>i</sub>.
  - f. A present was bought for Mary<sub>i</sub> by herself<sub>i</sub>.
- (14) a. ?The books were given to himself<sub>i</sub> by John<sub>i</sub>.
  - b. \*Mary was shown himself<sub>i</sub> by John<sub>i</sub>.
  - c. ?The books were thrown at each other<sub>i</sub> by the men<sub>i</sub>.
  - d. ??The package was received from herself<sub>i</sub> by Mary<sub>i</sub>.
  - e. \*Mary was hit with himself<sub>i</sub> by Superman<sub>i</sub>.
  - f. ??A present was bought for herself<sub>i</sub> by Mary<sub>i</sub>.

As Collins 2004 and others have noted, some of the examples in (14) do not sound as bad as expected. However, judgments concerning reflexive and reciprocal forms are notoriously slippery, given the fact that both emphatic and logophoric reflexives have the same form in English. Note also that the examples that sound better are usually ones in which the subject is ruled out as a possible antecedent by virtue of being inanimate. So (14) b. and e., for instance, are significantly worse than the other examples.

4. NPI effects (very robust):

- (15) a. Money was given to no student by any professor.



- b. The King was shown no slaves by any traders.
- c. Books were thrown at no professors by any students.
- d. A gift was received from no boss by any employee.
- e. The performers were hit with no rotten eggs by any spectators.
- f. Presents were bought for no professors by any students.

- (16) a. \*Money was given to any student by no professor.
- b. \*The King was shown any slaves by no traders.
  - c. \*Books were thrown at any professors by no students.
  - d. \*A gift was received from any boss by no employee.
  - e. \*The performers were hit with any rotten eggs by no spectators.
  - f. \*Presents were bought for any professors by no students.

5. Variable binding (very robust):

- (17) a. Money was given to each student by the others.
- b. The teacher was shown each student by the others.
  - c. Books were thrown at the students by one another.
  - d. Presents were received from each employee by the others.
  - e. The gangster was hit with each superhero by the others.
  - f. A present was bought for each man by the others.

- (18) a. \*Money was given to the others by each student.
- b. \*The teacher was shown the others by each student.
  - c. \*Books were thrown at one another by the students.
  - d. \*Presents were received from the others by each employee.
  - e. \*The gangster was hit with the others by each superhero.
  - f. \*A present was bought for the others by each man.

6. Weak crossover effects (weaker, as expected):

- (19) a. Money was given to every student by his mother.
- b. The judge was shown every horse by its trainer.
  - c. A book was thrown at every student by his professor.
  - d. A present was received from every employee by his boss.
  - e. The judge was hit with every pet by its owner.
  - f. A present was bought for every mother by her son.

- (20) a. ??Money was given to his mother by every student.
- b. \*The judge was shown its horse by every trainer.
  - c. ??A book was thrown at his professor by every student.
  - d. ?A present was received from his boss by every employee.
  - e. ??Mary was hit with his ruler by every teacher.
  - f. ?A present was bought for his mother by every son.

In short, though there are a few complications, the data very strongly supports the claim that the passive *by*-phrase is c-commanded by every other argument and quasi-argument in the proposed hierarchy of projections.

Turning now to the unspecified Agent of short passives, it has been argued that data such as the following show that there must be a *PRO<sub>arb</sub>* in [Spec, v] (Baker, Johnson and Roberts 1989):

- (21) a. Parties shouldn't be thrown only for oneself.  
 b. Beautiful presents shouldn't be bought only for oneself.  
 c. Nice gifts are seldom received from oneself.  
 d. The official was bribed (in order) to avoid the draft.  
 e. Dinner is usually eaten completely nude.

Examples such as (21) a.-c. do not reveal much, however, because phrases such as *for/from oneself* occur equally well in examples where there is no possible antecedent:

- (22) a. Parties shouldn't be only for oneself.  
 b. Presents shouldn't be only for oneself.  
 c. The nicest gifts are usually from oneself.

As for (21) d. and e., while such examples may argue for the existence of a null indefinite Agent, they show nothing about its position. In fact, the following data suggests that the understood Agent in a short passive is located in the same position as an overt *by*-phrase:

- (23) a. The official was bribed by Bush (in order) to avoid the draft.  
 b. Dinner is usually eaten by our guests completely nude.

If the theory proposed here is correct, the subjects of unergative verbs must derive from the same position as the Agents of passives, predicting that overt Agt-phrases should be able to occur in impersonal passives in languages that have them. This prediction is confirmed by German and Dutch examples such as the following (Comrie 1977):

- (24) a. Es wurde gestern (von uns) getanzt.  
 it was yesterday by us dance+EN  
 'there was dancing yesterday by us'  
 b. Es werd (door de jongens) gefloten  
 it was by the boys whistle+EN  
 'there was whistling by the boys'

Modifying slightly the analysis of impersonal passives proposed in Bowers 2002, example (24) b. can be derived as follows:

- (25) [<sub>TP</sub> es werd [<sub>PrP</sub> <es> [<sub>VoiP</sub> [<sub>AgtP</sub> [<sub>PP</sub> door de jongens] Agt <floten>] gefloten]  
 <werd>]]

As has frequently been noted, impersonals of this form are impossible with unaccusative predicates (Perlmutter 1978):

- (26) a. De bloemen waren binnen een paar dagen verflenst.  
           the flowers had in a few days wilted  
           ‘the flowers had wilted in a few days’  
       b. \*Er werd door de bloemen binnen een paar dagen verflenst.  
           it was by the flowers in a few days wilted

In the theory proposed here, this follows simply from the fact that the unaccusative verb *verflensen* in Dutch requires a Th-phrase, rather than an Agt-phrase.

An exact analogue of this phenomenon in English was noted by Emonds (1976):

- (27) The room was flown across by the bird/\*the book.

If the subject of *fly* is animate, hence can be construed as unergative, then the pseudopassive form is possible. If, however, it is inanimate, ruling out an agentive interpretation, then the pseudopassive is disallowed. Passive voice in English is possible if and only if an Agent-phrase is present, as is the case for unergative *fly* but not for unaccusative *fly*. Since English lacks impersonal passives, the only way for the probe in T to find a matching goal in such examples is to exceptionally permit the object of the Goal-phrase *across the room* to have structural rather than inherent Case, as is normally the case for objects of prepositions. Hence the fact that unergatives can have pseudopassive forms in English corresponds directly to the fact that impersonal passives of unergatives are possible in German and Dutch. Conversely, the fact that unaccusatives lack pseudopassives in English corresponds directly to the absence of impersonal passives of unaccusatives in those languages.

In summary, a variety of evidence strongly supports the claim that the Agent of transitive verbs in both active and passive sentences, as well as the Agent of unergative verbs in both active and impersonal passive sentences, all derive from the same syntactic position. That position is quite low in the thematic hierarchy. In fact, Agents are c-commanded by every other argument or “quasi-argument” including Themes, Applicatives, Sources, Goals, Locatives, Benefactives, and Instrumentals. Only true modifiers such as Manner, Time, Place and Purpose adverbials are lower than Agents.

### B. *The double object construction*

I next show how the active and passive forms of the “double object” construction can be derived in this framework. Appl-phrases are similar to Agt-phrases in English in that they can be realized either as a PP (headed by *to*, in this instance) or as an active DP with structural Case. Furthermore, let us assume that a Th-phrase in English can either take structural Case or simply be left Caseless. In standard Case theory the latter assumption would be impossible, since Case renders DPs “visible” for  $\theta$ -role assignment. However, no such requirement is needed here, since  $\theta$ -roles are assigned directly by thematic heads

to whatever constituent occupies their specifier. Suppose the Appl-phrase *Mary* in example (1) is realized as an active DP with structural Case. Then the Th-phrase *the ball* must exercise the option of being Caseless; otherwise, there would be too many active DPs, one of which would be unable to have its Case feature valued, and the derivation would crash. The probe in Voi then forms an Agree relation with the DP *Mary*, assigning it ACC Case and moving it to [Spec, Voi]. The remainder of the derivation is the same as in (5). The result is the “double object” sentence *John threw Mary the ball*:

(28) [TP John Past [PrP <John> throw-Pr [VoiP Mary-<throw-Voi> [ThP the ball <throw-Th>  
 NOM  $\phi$   $\phi$  ACC  $\phi$  [-Case]  
 [AppIP <Mary> <throw-AppI> [AgtP <John> <throw-Agt> <throw>]]]]]]  
 $\phi$   $\phi$

Suppose, on the other hand, the Appl-phrase has structural Case and the Agt-phrase is realized as a PP headed by *by*. The derivation then proceeds just as in (6), except that the applicative DP *Mary* is raised successively to [Spec, Voi], [Spec, Pr] and [Spec, T], instead of the “basic object” *the ball*. The result is the passive form *Mary was thrown the ball by John*:

(29) [TP Mary Past [PrP <Mary> be [VoiP <Mary> throw+EN [ThP the ball <throw-Th>  
 NOM  $\phi$   $\phi$   $\phi$  [-Case]  
 [AppIP <Mary> <throw-AppI> [AgtP by John] <throw-Agt> <throw>]]]]]]  
 $\phi$

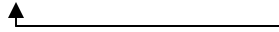
The syntactic properties of the double object and prepositional dative constructions in both their active and passive forms thus follow from a fundamental property of UG, namely, the fact that there are just two possible structural Case assigners (located in T and Voi), together with the fact that syntactic constituents that bear a thematic relation to a predicate may be realized in just one of the following ways: (i) as a DP with structural Case that must be valued through an Agree relation; (ii) as a PP or KP marked with inherent Case; (iii) as a Caseless DP; (iv) as a Caseless null indefinite pronoun. Notice incidentally that movement of Appl-phrases and Th-phrases to [Spec, Voi] is further confirmed by their position between the copula and the passive participle in expletive sentences such as *there was a book given to Mary (by John)*, *there was someone given a book (by John)*. (See derivation (5) in Appendix II, for details.)

As is readily apparent, this analysis accounts directly for the well-known fact that the c-command asymmetry between Th-phrase and Appl-phrase is reversed in the double-object construction (Barss and Lasnik 1986). Another supporting argument can be derived from the apparent shift of particles from a position following the Th-phrase in the prepositional dative to a position preceding it in the double object construction:

- (30) a. John gave the book back to Mary (\*back).  
 b. John gave Mary back the book (\*back).

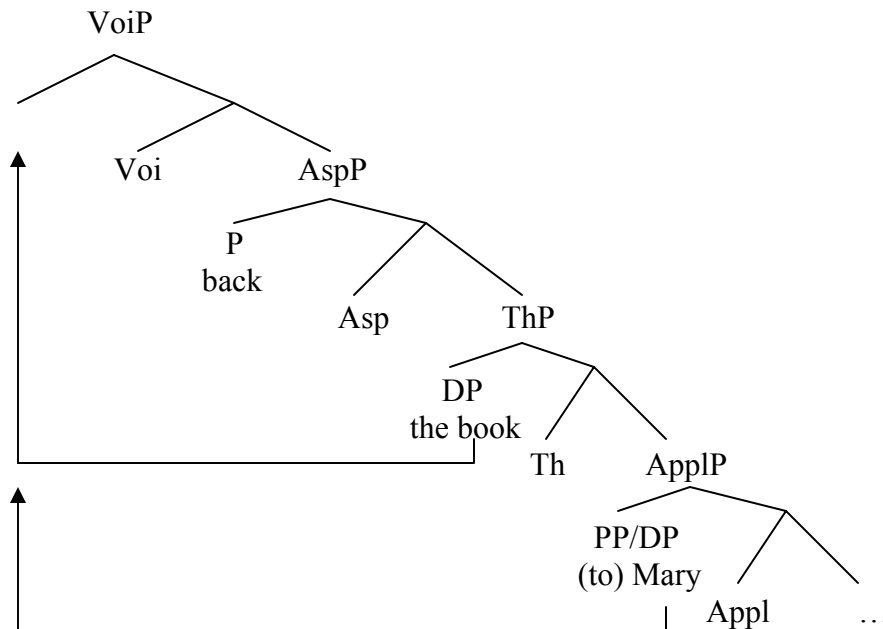
This is particularly puzzling for any traditional type of analysis that attempts to derive the double object construction from an underlying prepositional dative structure by moving the dative to the left of the Th-phrase:

(31) John gave the book back to Mary



Let us assume that “moveable” prepositions in English are aspectual particles generated in the specifier of a category *Aspect* which is ordered in the UHP between Voi and Th. The data in (30) then follow immediately from the analysis proposed here:

(32)



Depending on whether the Case of the Th-phrase or the Appl-phrase is valued by the probe in Voi and moved to [Spec, Voi], the particle will either appear after or before the Th-phrase.

Widening the scope of our observations, note that Th-phrases can also be marked with inherent Case by prepositions such as *about* and *of*. Furthermore, some verbs permit only inherently case-marked Appl-phrases, whereas others permit only Appl-phrases with structural Case. These points are illustrated by the following array of data containing only verbs of saying and telling:

- (33) a. I    said    (\*Mary)    a few words            (to Mary)  
           uttered  
           expressed        my thoughts  
           revealed
- b. I    told    (Mary)    the truth                (to Mary)
- c. I    told    Mary    (about the situation) (\*to Mary)



- (37) a. John has the book.  
 b. The book belongs to John.

The obvious intuition is that *John* in both examples is an Appl-phrase, while *the book* is a Th-phrase. The non-agentive character of the subject of (37) a. is supported by the fact that it cannot passivize: *\*the book is had by John*. (Note the contrast with *own*: *the book is owned by John*, suggesting that the subject of *own* is in fact an Agent.) If *have* (in this sense) has the features {[Th], [D, [-Case]]} and {[Appl], [D,φ]}, while *belong* is specified with the features {[Th], [D,φ]} and {[Appl], [top]}, then both will be derived from the common Th-AppI pattern by the principles already at our disposal:

(38) a. [<sub>TP</sub> John Pres [<sub>PRP</sub> <John> have-Pr [<sub>ThP</sub> the book <have-Th> [<sub>AppIP</sub> <John> <have-  
 NOM φ φ [-Case] φ  
 Appl> [<have>]]]]]

b. [<sub>TP</sub> the book Pres [<sub>PRP</sub> <the book> belong-Pr [<sub>ThP</sub> <the book> <belong-Th> [<sub>AppIP</sub> to  
 NOM φ φ φ  
 John <belong-AppI> [<belong>]]]]]

The general point, then, is that a wide range of thematic patterns that have been noted in the literature can be given direct syntactic expression in the theory proposed here.

### C. Applicative constructions

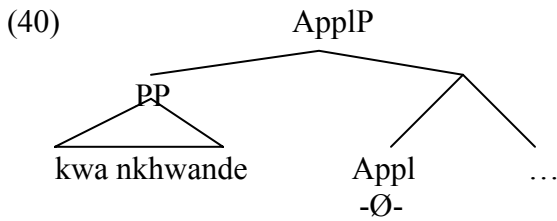
I show next that languages with so-called grammatical function-changing morphology can be accounted for very simply and directly in the proposed framework without having to assume either special rules that change the function of NPs, as in RG, or extensive processes of syntactic “incorporation” of the sort proposed by Baker 1988. I focus primarily on applicative constructions of the sort that Baker handles by means of Preposition Incorporation (PI), but I conclude by indicating briefly how the observed range of grammatical function-changing morphology is predicted by the principles proposed here.

1. Perhaps the most fundamental question regarding function-changing morphology is simply this: why should the grammatical function of a constituent be marked by a piece of verbal morphology at all? Notice that Incorporation theory doesn’t really provide a satisfactory answer to this question. In the case of PI, for example, it is simply stipulated that Prepositions incorporate by adjoining to the verb. But why do Prepositions incorporate and not, for instance, Adjectives? And why do Prepositions that just happen to be verbal morphemes incorporate while ‘real’ Prepositions do not? In contrast, the answer provided by my theory is straightforward: functional morphology can be verbal because the heads that introduce phrases with various grammatical functions simply *are* verbs, constituting part of the extended projection of the verb. Assuming any reasonable kind of head raising process, whatever morphemes happen to be present in a given functional head will automatically become part of the morphology of the raised verb. In fact, there is only one minor difference between PI in a language such as English and PI

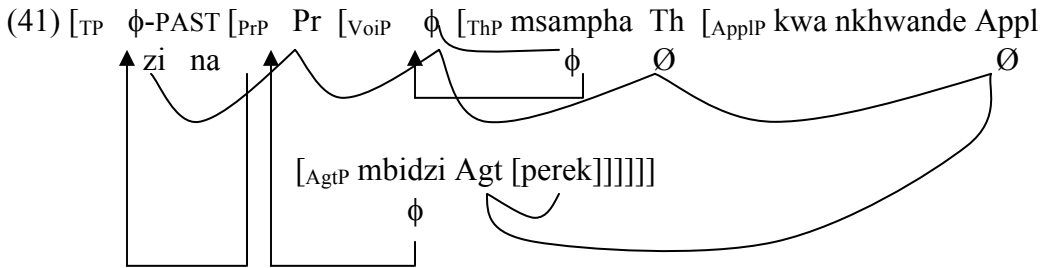
in a language such as Chichewa. The Appl head in English is invariably phonetically null, regardless of whether the constituent in [Spec, Appl] is realized as a DP with structural Case or as a PP with inherent Case. In Chichewa, on the other hand, a DP with structural Case is usually (though not invariably) accompanied by the special morpheme *-ir-* in the Appl head, while a PP with inherent Case requires a phonetically null Appl head. To see this, I derive the following examples of PI in Chichewa (Baker 1988):

- (39) a. Mbidzi zi-na-perek-a msampha kwa nkhandwe.  
zebras SP-PAST-hand-ASP trap to fox  
'The zebras handed the trap to the fox.'
- b. Mbidzi zi-na-perek-er-a nkhandwe msampha.  
zebras SP-PAST-APPL-ASP fox trap  
'The zebras handed the fox the trap.'

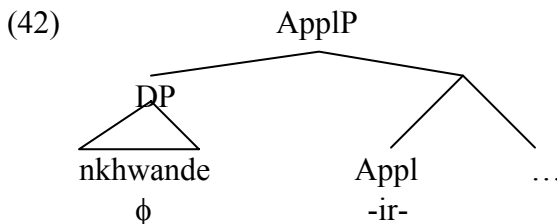
The structure of the ApplP in (37) a. is virtually identical to that of English:



and the derivation is thus virtually identical to (5), except that the verb in Chichewa continues on to T rather than stopping at Pr, as it does in English:

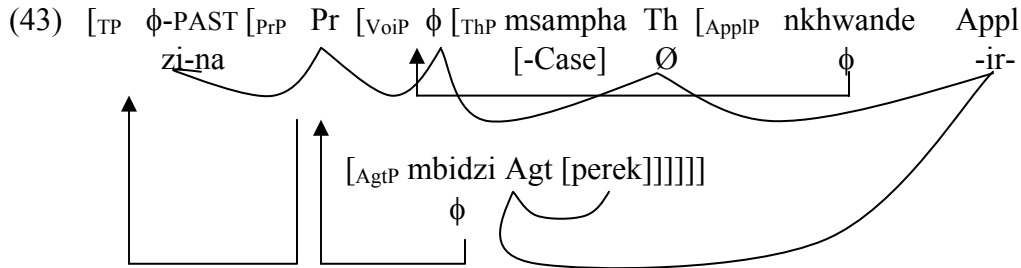


The structure of the ApplP in (39) b. is also virtually the same as in English, the only difference being that the Appl-head is occupied by the morpheme *-ir-* in Chichewa:



Hence the derivation would look as follows:





In the theory proposed here, the morpheme *-ir-* is not claimed to be a Preposition, as it is in Incorporation theory. Rather, it is simply a verbal morpheme in the head of the Appl projection, which therefore automatically combines with the verb *perek* when the latter raises and amalgamates with Appl. I assume that when a functional head is realized phonetically as a morpheme, it is classified as either a prefix or a suffix. If it is marked as a prefix, head adjunction is to the right; if it is marked as a suffix, head adjunction is to the left. Hence the phonetic result of amalgamating the root *perek* with the Appl suffix *-ir* is *perek-er*. The tense and agreement morphemes in Chichewa, on the other hand, are prefixes, so the phonetic result of adjoining the verb to T will be *zi-na-perek-er-(e)*. I will assume that the “aspect” suffix *-e-* is a phonetic realization of Pr, accounting for its position after all the thematic suffixes.

Notice, incidentally, that it follows trivially from this theory that arguments in embedded structures can never be applicativized, because applicative objects are not formed, as in Incorporation theory, by moving and adjoining Prepositions to V. Only constituents that bear a thematic relation to the verb have the potential to become applicative objects.

2. A general property of applicativization processes is what Baker terms *Marantz’s Generalization (MG)*, which states basically that applicative objects behave syntactically like direct objects. A corollary of MG is that the “basic object”, the object that was “displaced” by the applicative object no longer has object properties. Thus in Chichewa, for example, applicative objects can optionally trigger object agreement, in which case the applicative object may optionally “pro-drop.” An applicative object may also become the subject of a passive. The displaced object, on the other hand, can no longer do any of these things. These properties are illustrated for the benefactive applicative construction in Chichewa (Baker 1988):

- (44) a. Amayi a-ku-umb-ir-a mwana mtsuko.  
 woman SP-PRES-mold-BEN-ASP child waterpot  
 ‘The woman is molding the waterpot for the child.’  
 b. Amayi a-ku-**mu**-umb-ir-a mtsuko **mwana**.  
 woman SP-PRES-OP-mold-BEN-ASP waterpot child  
 ‘The woman is molding the waterpot for the child.’  
 c. Amayi a-ku-**mu**-umb-ir-a mtsuko.  
 woman SP-PRES-OP-mold-BEN-ASP waterpot  
 ‘The woman is molding the waterpot for him.’  
 d. \*Amayi a-na-**u**-umb-ir-a mwana **mtsuko**.  
 woman SP-PAST-OP-mold-BEN-ASP child waterpot



Notice that the order of the applicative and passive suffixes *-ir* and *-idw*, respectively, in the passive applicative form *zi-na-gul-ir-idw-a* follows automatically from the derivation. The opposite order is impossible to derive, given the UHP, and in fact is never found in Chichewa.

3. Baker (1988) observes that another general property of applicatives is that there can be no more than one applicative per clause. This follows immediately from the fact that the Probe in Voi is the only other Probe available besides the one in T. Since the latter must be used to value the Case feature of the Agt-phrase, it follows that if more than one DP with a structural Case feature besides the Agt-phrase is generated, there will be no way to value more than one of them and the derivation will crash.

This same property also accounts for a number of other general observations concerning applicatives. Baker observes, for example, that applicative objects are not possible with verbs that lack an object. A verb that cannot take an object is either intransitive, in which case it lacks Voi altogether, or else has Voi but suppresses its  $\phi$ -features (as is the case in passives, for example). In either case there will simply be no probe available to value the Case feature of an applicative object. Thus, for example, in Bahasa Indonesian (Chung 1976) a verb such as *bawa* ‘bring’, which takes both a direct object and a Goal-PP, can appear in an applicative construction, whereas a verb such *umbang* ‘donate’, which takes only a Goal/Dative PP, cannot:

- (48) a. Mereka mem-bawa daging itu kepada dia.  
 they TRANS-bring meat the to him  
 ‘They brought the meat to him.’  
 b. Mereka mem-bawa-kan dia daging itu.  
 they TRANS-bring-APPL him meat the  
 ‘They brought him the meat.’
- (49) a. Ajah saja menj-umbang kepada rumah sakit.  
 father my TRANS-donate to house sick  
 ‘My father donated to the hospital.’  
 b. \*Ajah saja menj-umbang-kan rumah sakit.  
 father my TRANS-donate-APPL house sick  
 ‘My father donated to the hospital.’

Noting that the verb in both (48) a. and (49) a. has the Voice prefix *mem/menj-* which marks active transitive sentences, we might hypothesize that this is actually a case where Voi is present but the  $\phi$ -features are suppressed. Alternatively, it might be a pure intransitive lacking a VoiP altogether. Whichever analysis is correct, the pattern in (48)-(49) is predicted by the theory. Exactly the same pattern is found in English:

- (50) a. John gives large donations to hospitals.  
 b. John gives hospitals large donations.  
 c. John gives (generously) to hospitals.  
 d. \*John gives hospitals (generously).

Baker (1988: 254-256) also shows that in Chichewa applicative objects are impossible for both unaccusative and unergative verbs, where Voi is clearly lacking altogether:

- (51) a. Chiphadzuwa chi-a-fik-a.  
 beautiful-woman SP-PERF-arrive-ASP  
 ‘The beautiful woman has arrived.’  
 b. \*Chiphadzuwa chi-a-fik-ir-a mfumu.  
 beautiful-woman SP-PERF-arrive-APPL-ASP chief  
 ‘The beautiful woman has arrived for the chief.’
- (52) a. Kalulu a-na-sek-a.  
 hare SP-PAST-laugh-ASP  
 ‘The hare laughed.’  
 b. \*Kalulu a-na-sek-er-a atsikana.  
 hare SP-PAST-laugh-APPL-ASP girls  
 ‘The hare laughed for the girls.’

Again, analogous facts are found in English:

- (53) a. I rolled the ball to Mary.  
 b. I rolled Mary the ball.  
 c. The ball rolled to Mary.  
 d. \*The ball rolled Mary.
- (54) a. John cooked a meal for Mary.  
 b. John cooked Mary a meal.  
 c. John cooked for Mary.  
 d. \*John cooked Mary.

Yet another prediction made by the fact that a maximum of two Probes are available to assign structural Case is that any sort of *derived* intransitive should also be unable to take an applicative object. In Chichewa, for example, stative unaccusative verbs formed by adding the suffix *-ik* to active transitive verbs cannot have applicative objects (Baker 1988: 256-257):

- (55) a. Fisi a-na-sw-a mtsuko.  
 hyena SP-PAST-break-ASP waterpot  
 ‘The hyena broke the waterpot.’  
 b. Mtsuko u-na-sw-ek-a.  
 waterpot SP-PAST-break-STAT-ASP  
 ‘The waterpot was broken.’  
 c. \*Mtsuko u-na-sw-ek-er-a mbuzi.  
 waterpot SP-PAST-break-STAT-APPL-ASP goat  
 ‘The water pot was broken for the goat.’

I assume that the “stative” suffix *-ek* is contained in the Th head and c-selects a D with structural Case: [<sub>ThP</sub> DP [ Th-*ek*]]. Since intransitive verbs, by definition, lack both Voi and Agt, it follows that there will be no room for an Appl object, since there is only one

probe available, which must be used to assign Case to the Th-phrase. Similar predictions hold for English also, as shown by (54) above and also by so-called “middle” forms, which are clearly derived from transitives (Bowers 2002):

- (56) a. We sell these books to college students.  
 b. These books sell to college students.  
 c. \*These books sell college students.

For exactly the same reason, as was mentioned earlier, applicative constructions can never be formed from passive verbs, as the following data from Chichewa shows (Baker 1988):

- (57) a. Nsima i-na-phik-idw-a ndi mbidzi.  
 cornmush SP-PAST-cook-PASS-ASP by zebras  
 ‘The cornmush was cooked by the zebras.’  
 b. \*Nsima i-na-phik-idw-ir-a kadzidzi ndi mbidzi  
 cornmush SP-PAST-cook-PASS-APPL-ASP for the owl by zebras  
 ‘The cornmush was cooked for the owl by the zebras.’

This observation is further supported by the well-known fact that in most dialects of English objects cannot be passivized in dative-shifted sentences:

- (58) a. A book was given ??(to) Mary by John.  
 b. A meal was cooked \*(for) Mary by John.

Dialects that do allow such examples can be accounted for by permitting Appl—and perhaps Ben as well—to c-select either a PP or a Caseless DP. However, languages such as Kinyarwanda in which both basic and applied objects can be passivized and optionally marked by object agreement morphemes must apparently be allowed the option of assigning structural Case to both the basic and applicative object—an option that appears to be highly marked and hence quite rarely found (Baker 1988: 264-266).

Returning briefly to the aspectual particles in English discussed earlier, consider the following examples:

- (59) a. John gave back the book to Mary.  
 b. John gave back Mary the book.

To explain these forms, I propose that in English aspectual particles can either be c-selected in [Spec, Asp] or appear directly in the head of Asp, in which case they will combine morphologically with the verb when it adjoins to Asp:

- (60) ...[Pr John Pr [VoiP the book Voi [AspP [Asp back][ThP <the book> Th [AppIP to Mary  
 Appl [AgtP <John> Agt [v give]]]]]]]
-

*D. The typology of function-changing morphology*

I will finish up by showing that the theory proposed here predicts exactly the typology of “function-changing” morphology that is empirically observed. Recall that there are just two basic principles in UG:

- A. There are just two categories—T and Voi—containing probes capable of assigning structural Case.
- B. The probe in Voi is optional, while the probe in T is obligatory.

Given these constraints, the following possibilities are predicted:

- 1. Both T and Voi present; Voi is active and has probe.
- 2. Both T and Voi are present; Voi is passive, may or may not have probe.
- 3. Voi is absent entirely.

Case 1. has three subcases, two of which have been discussed here already, and yields transitive active sentences, as well as applicative constructions of various kinds:

- 1. a. Theme is assigned ACC by Voi; Agent is assigned NOM by T. This yields basic transitive active sentences.
- b. If a language permits the Theme to be Caseless and one or more other thematic roles to be realized by a DP with structural Case, then the “applicative object” is assigned ACC and the Agent is assigned NOM.
- c. If a language permits T to agree with an expletive, then Voi assigns ACC to the Theme and Agent must be assigned inherent Case, yielding “impersonal transitives” in Russian and other languages. (See Bowers 2002, for discussion.)

Case 2. yields transitive passive sentences of various kinds if the Theme is case-marked NOM by T and the Agent is marked with inherent Case or reduced to PRO<sub>arb</sub>. It results in Noun-Incorporation structures if the Agent is case-marked NOM by T and the thematic requirements of the root are satisfied by morphologically incorporating a Theme Noun into the verb:

- 2. a. Theme is assigned NOM by T; Voi has no probe and Agent is therefore either PRO<sub>arb</sub> or is assigned inherent Case or marked with a Preposition. This is the standard type of passive found in most languages.
- b. T agrees with an expletive; Voi assigns ACC; Agent is PRO<sub>arb</sub> or assigned inherent Case. Ukrainian “impersonal passive” (see Bowers 2002, for discussion).
- c. Agent case-marked NOM; verb’s need for a Theme satisfied by incorporating a bare Noun into verb. This is Noun-Incorporation (NI).

Case 3. yields intransitives of various kinds, including unaccusatives and unergatives, and “Antipassive” constructions if the Theme is marked with inherent oblique Case or reduced to PRO<sub>arb</sub>:

3. a. Theme is case-marked NOM by T; Agent is eliminated entirely. Unaccusative sentences.
- b. Agent is case-marked NOM by T; Theme is eliminated entirely. Unergative sentences.
- c. Agent is case-marked NOM (or ABS); Theme marked with inherent oblique Case or realized as PRO<sub>arb</sub>. Verb frequently marked with “Antipassive” morpheme.

I eschew discussion of the various kinds of impersonal constructions, some of which I have discussed elsewhere. However, a couple of points regarding NI and Antipassive constructions need to be made.

Consider first Noun Incorporation. One of Baker (1988)’s major arguments in support of Incorporation theory is his claim that objects but not subjects can be incorporated, as illustrated in the following data from Mohawk:

- (61) a. Yao-wir-a?a ye-nuhwe?-s ne ka-nuhs-a?  
 PRE-baby-SUF 3FS/3N-like-ASP the PRE-house-SUF  
 ‘The baby likes the house.’
- b. Yao-wir-a?a ye-nuhs-nuhwe?-s.  
 PRE-baby-SUF 3FS/3N-house-like-ASP  
 ‘The baby house-likes.’
- c. \*Ye-wir-nuhwe?-s ne ka-nuhs-a?  
 3FS/3N-baby-like-ASP the PRE-house-SUF  
 ‘Baby-likes the house.’

The reason this data is crucial is that NI is a syntactic movement rule, hence subject to the ECP, or its equivalent. Of course the theory proposed here makes exactly the same prediction, since NI is simply a detransitivization process that permits the need of a verb for a Th-phrase to be satisfied morphologically within the ThP projection:

- (62) [<sub>TP</sub> yao-wir-a?a ye-nuhs-nuhwe? [<sub>PRP</sub> t < nuhs-nuhwe?-Pr > [<sub>ThP</sub> < [<sub>Th</sub> nuhs-  
 $\phi$  N  
 nuhwe? >] [<sub>AgtP</sub> t' < nuhwe?-Agt > < nuhwe? > ]]]]  
 V

Since subjects are only formed after NI takes place within the ThP, there is no way that a subject could ever be incorporated. On the other hand, there is no reason, under my theory, why *Agents* could not be incorporated, *but in order for this to occur the sentence must be passive*. The reason is clear: since the incorporated Agt is no longer available to enter into an Agree relation, the probe in Voi must be suppressed in order to permit the





This accounts straightforwardly for the fact that the Antipassive morpheme is the marker of a type of detransitivized sentence in which a structurally Case-marked Theme has been replaced by either an unspecified null PRO or by an oblique Case-marked DP.

Incorporation theory, in contrast, is driven to the assumption that the verbal morpheme *-a-* is actually a Noun which incorporates into the verb. To the extent that there are syntactic similarities between Antipassive and NI, they can be accounted for in the present framework by generating bare nouns directly in the Th-head, where they will be morphologically incorporated into the raised verb while at the same time satisfying its  $\theta$ -requirements. Notice, incidentally, that Antipassive constructions, like others we have examined, need not be marked morphologically. Thus so-called ‘object-drop’ or unspecified object constructions in languages like English are simply a kind of Antipassive construction that does not happen to be morphologically marked on the verb:

- (67) a. I ate PRO<sub>arb</sub> at 3:00.  
 b. Mary gave PRO<sub>arb</sub> to a new charity this year.

Likewise, verbs in English can also be detransitivized by marking the object with oblique prepositions, though there is no regular pattern for doing so:

- (68) a. John partook of some beer. (cp. John drank some beer.)  
 b. Mary picked at her dinner. (cp. Mary ate her dinner.)

### E. Causativization

To complete this survey, I discuss very briefly a subcase of 1. that arises when the number of arguments of a verb is *increased* by adding a second or ‘Causative’ Agent. In the framework proposed here, there is no motivation for deriving causatives from biclausal structures by means of Verb Incorporation (VI). Rather, the causative suffix is simply a piece of verbal morphology that may occur in some languages in the head of a new thematic category ‘Caus’. Consider the following example from Chichewa:

- (69) Mtsikana anau-gw-ets-a mtsuko.  
 girl AGR-fall-CAUS-ASP waterpot  
 ‘The girl made the waterpot fall.’

Here addition of the Caus-phrase *mtsikana* ‘girl’ requires that the causative suffix *-ets-* be added to the intransitive stem *-gw-* ‘fall’, a phenomenon that can be accounted for by a derivation such as the following:

- (70) [TP mtsikana anau [PrP <mtsikana> Pr [VoiP mtsuko Voi [ThP <mtsuko> Th [CausP  
 NOM AGR  $\phi$  ACC  $\phi$   $\phi$   
 <mtsikana> Caus [gw]]]]]]  
 $\phi$  -ets
-

In order for both Caus and Th to be Case-marked, there must be a probe in Voi, as well as the obligatory probe in T. Hence the causativized verb becomes transitive and the ‘Causee’, the argument of intransitive *-gw-* ‘fall’, becomes its object and the Caus-phrase becomes its subject. This is the universal pattern for causatives of intransitives. Notice, incidentally, that nothing in this analysis prevents unergatives as well as unaccusatives from being causativized, a prediction confirmed by the fact that agentive intransitives in Chichewa such as *-sek-* ‘laugh’ can be causativized:

- (71) Buluzi a-na-sek-ets-a                      ana.  
 lizard SP-PAST-laugh-CAUS-ASP children  
 ‘The lizard made the children laugh.’

English also has causatives of unergatives:

- (72) a. John galloped the horse.  
 b. Mary burped the baby.  
 c. The doctor bled the patient.

showing that it is incorrect to derive the subjects of unergatives from [Spec, v]. This is further confirmed by the observation (Bowers 1993, 2002) that causatives of unergatives can themselves be detransitivized, yielding “middle” sentences identical in form to intransitives but different in meaning:

- (73) a. The horse gallops well. (ambiguous: =‘the horse is good at galloping’ or ‘it is easy  
 b. The baby burps easily.    to gallop the horse’)  
 c. The patient bleeds well.

Predictably, the facts are somewhat more complicated for causatives of transitives. Causativizing a transitive verb creates a three-place predicate, but since there are only two possible probes that can assign structural Case, one of the arguments must either receive inherent Case or become Caseless. There are two patterns, depending on other properties of the language. For languages such as Chichewa B that allow “double object” constructions, the Agt of the transitive verb becomes an applicative object and the object of the transitive is Caseless:

- (74) Catherine a-na-kolo-ets-a                      mwana wake chimanga.  
 Catherine SP-PAST-harvest-CAUS-ASP child her corn  
 ‘Catherine made her child harvest the corn.’

This pattern follows immediately from the principles outlined earlier, given the assumption that the Agt of *-kolo-* ‘harvest’ can be realized as an active DP with structural Case (an assumption that is needed in any case in order to produce transitive active sentences with *-kolo-*):

- (75) [TP Catherine a-na [PrP <Catherine> Pr [VoiP mwana wake Voi [ThP chimanga Th  
 NOM SP-PAST  $\phi$  ACC  $\phi$  [-Case]  
 [AgtP <mwana wake> Agt [CausP <Catherine> Caus [kolo]]]]]]]]  
 $\phi$   $\phi$  -ets

The correctness of this analysis is confirmed by the fact that the Agt-phrase behaves in every respect like an object, e.g. it can passivize and be marked optionally by an OA morpheme, whereas the Th-phrase does not (Baker 1988).

In languages such as Chichewa A, however, in which there is no double object construction, but only a ‘prepositional’ dative, the Agt of the transitive has no option but to go into a dative PP and the object of the transitive becomes the object of the causative:

- (76) Anyani a-na-meny-ets-a ana kwa buluzi.  
 baboons SP-PAST-hit-CAUS-ASP children to lizard  
 ‘The baboons made the lizard hit the children.’

To account for this pattern, we need only assume that Agt-phrases in Chichewa A may c-select a PP headed by *kwa*, producing the following derivation:

- (77) [TP anyani a-na [PrP <anyani> Pr [VoiP ana Voi [ThP <ana> Th [AgtP kwa buluzi  
 NOM SP-PAST  $\phi$  ACC  $\phi$   $\phi$   
 Agt [CausP <anyani> Caus [meny]]]]]]]]  
 $\phi$  -ets

Notice that though the Agt-phrase *buluzi* ‘lizard’ could also be realized as an active DP with structural Case in a structure such as (77), such a derivation would crash in this language because there would be three DPs requiring Case-marking and only two probes able to do so. Once again, the correctness of this analysis is confirmed by the fact that it is the Th-phrase of the basic transitive in Chichewa A that can passivize and take optional OA marking.

Note finally that this theory of causativization predicts correctly that causatives can be applicativized or passivized, but not vice-versa and, as the following example from Swahili shows (Aggrey Wasike, pc), that all three processes can occur in the fixed order Caus-Appl-Pass:

- (78) mkwe wake a-li-rud-ish-i-w-a zawadi (na Yusuf)  
 mother-in-law SP-PAST-return-CAUS-APPL-PASS-ASP present (by Yusuf)  
 ‘His mother-in-law was returned the present (by Yusuf).’



1. OCC feature of Voi satisfied by moving *on the table* to [Spec, Pr].
2. OCC feature of Pr satisfied by moving *on the table* to [Spec, Pr]. RPIC prevents OCC feature of Pr from being satisfied by moving *a book* to [Spec, Pr].
3. Probe in T Case-marks nearest Goal *a book*; OCC feature of T is immediately satisfied by moving nearest constituent *on the table* to [Spec, T].

(5) There was a book placed on the table by Mary.

[<sub>TP</sub> there Past [<sub>PrP</sub> <there> be-Pr [<sub>VoiP</sub> a book place+EN-Th [<sub>ThP</sub> <a book> <place-Th>  
 $\phi$  NOM  $\phi$   
 [<sub>LocP</sub> on the table <place-Loc> [<sub>AgIP</sub> [<sub>PP</sub> by Mary] <place-Agt> <place>]]]]]]

1. OCC feature of Voi satisfied by moving Th-phrase *a book* to [Spec, Voi].
2. OCC feature of Pr satisfied by merging expletive *there* in [Spec, Pr]; RPIC prevents OCC feature of Pr from being satisfied by moving *on the table* or *by Mary* to [Spec, Pr].
3. Probe in T Case-marks nearest Goal *a book*; OCC feature of T is immediately satisfied by moving nearest constituent *there* to [Spec, T]. RPIC prevents anything other than *there* to [Spec, T].

## Appendix II: Compositional semantics for thematic heads

### Assumptions:

1. Denotation of a verb is a set of events:

$$\llbracket \text{kiss} \rrbracket = \lambda e \text{ kiss}(e) \quad \text{type: } \langle v, t \rangle, v \text{ the type of events}$$

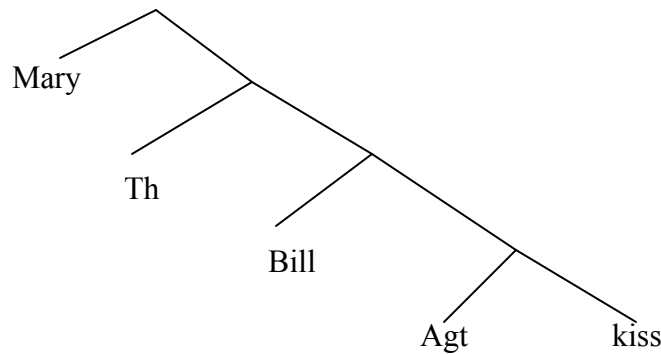
2. Thematic relations are added by their own heads:

$$\llbracket \text{Agt} \rrbracket = \lambda P \lambda y \lambda e [P(e) \wedge \text{Agent}(e, y)] \quad \text{type: } \langle \langle v, t \rangle, \langle e, \langle v, t \rangle \rangle \rangle$$

i.e. Agt takes an event property and an individual as arguments.

$$\llbracket \text{Th} \rrbracket = \lambda P \lambda x \lambda e [P(e) \wedge \text{Theme}(e, x)] \quad \text{type: } \langle \langle v, t \rangle, \langle e, \langle v, t \rangle \rangle \rangle$$

### Derivation:



$$\frac{}{\lambda y \lambda e [\text{kiss}(e) \wedge \text{Agent}(e, y)]} \quad (1)$$

$$\frac{}{\lambda e [\text{kiss}(e) \wedge \text{Agent}(e, \text{Bill})]} \quad (2)$$

$$\frac{}{\lambda x \lambda e [\text{kiss}(e) \wedge \text{Agent}(e, \text{Bill}) \wedge \text{Theme}(e, x)]} \quad (3)$$

$$\frac{}{\lambda e [\text{kiss}(e) \wedge \text{Agent}(e, \text{Bill}) \wedge \text{Theme}(e, \text{Mary})]} \quad (4)$$

### Steps:

$$\begin{aligned} \llbracket \text{Agt} \rrbracket ( \llbracket \text{kiss} \rrbracket ) &= \lambda P \lambda y \lambda e [P(e) \wedge \text{Agent}(e, y)] (\lambda e \text{ kiss}(e)) = \\ &\quad \uparrow \hspace{10em} \downarrow \hspace{1em} \text{(\lambda-Conversion)} \\ &\lambda y \lambda e [\lambda e [\text{kiss}(e)](e) \wedge \text{Agent}(e, y)] = \\ &\quad \uparrow \hspace{1em} \downarrow \hspace{1em} \text{(\lambda-Conversion)} \\ &\lambda y \lambda e [\text{kiss}(e) \wedge \text{Agent}(e, y)] \quad (1) \end{aligned}$$

$$\begin{aligned}
 ([\text{Agt}] ([\text{kiss}] ))(\text{Bill}) &= \lambda y \lambda e [\text{kiss}(e) \wedge \text{Agent}(e,y)](\text{Bill}) = \\
 &\quad \lambda e [\text{kiss}(e) \wedge \text{Agent}(e,\text{Bill})] \quad (\lambda\text{-Conversion}) \\
 &\quad (2)
 \end{aligned}$$

$$[[\text{Th}] (([\text{Agt}] ([\text{kiss}] ))(\text{Bill})) =$$

$$\begin{aligned}
 &\lambda P \lambda x \lambda e [P(e) \wedge \text{Theme}(e,x)](\lambda e [\text{kiss}(e) \wedge \text{Agent}(e,\text{Bill})]) = \\
 &\quad \lambda x \lambda e [\lambda e [\text{kiss}(e) \wedge \text{Agent}(e,\text{Bill})](e) \wedge \text{Theme}(e,x)] = \\
 &\quad \lambda x \lambda e [\text{kiss}(e) \wedge \text{Agent}(e,\text{Bill}) \wedge \text{Theme}(e,x)] \quad (\lambda\text{-Conversion}) \\
 &\quad (3)
 \end{aligned}$$

$$([\text{Th}] (([\text{Agt}] ([\text{kiss}] ))(\text{Bill}))) (\text{Mary}) =$$

$$\begin{aligned}
 &\lambda x \lambda e [\text{kiss}(e) \wedge \text{Agent}(e,\text{Bill}) \wedge \text{Theme}(e,x)](\text{Mary}) = \\
 &\quad \lambda e [\text{kiss}(e) \wedge \text{Agent}(e,\text{Bill}) \wedge \text{Theme}(e,\text{Mary})] \quad (\lambda\text{-Conversion}) \\
 &\quad (4)
 \end{aligned}$$

Result: Parsons-style representation of argument structure. All arguments, quasi-arguments and modifiers can be introduced in similar fashion. See Parsons (1990) for semantic arguments in support of such representations. (Many thanks to Dorit Abusch for assistance with this section!)

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