

III Argument Structure and Phrase Structure

9 Thematic Relations in Syntax

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1 Thematic Roles and Grammatical Arguments

The grammatical arguments in a sentence are commonly described in terms of their relations in the eventuality expressed (Gruber 1965, Fillmore 1968). For example, in (1a), the subject “John” is described as an Agent of the action, and the object “the house” is described as a Patient or Theme. Similarly, in (1b), the subject “the electrode” is a Source, while the object “ions” is a Theme and “the medium” a Goal. In (1c), “ions” is again a Theme, but subject, while the Goal, “the electrode,” is object. In (d), “ions” is a Theme and object while the subject “the medium” is a Location. These all consist in relations to a Theme. They have therefore been called thematic relations (Jackendoff 1972) or theta-roles (Chomsky 1981). In (1d) there is a Location–Theme relation, while in (1b) and (1c) Source and Goal are initial and final Locations of the Theme. The Agent in (1a) is a Source¹ whose Theme is the action as a whole:

- (1) a. John destroyed the house.
- b. The electrode emitted ions into the medium.
- c. Ions struck the electrode.
- d. The medium contains ions.

Thematic relations are basically conceptual. The claim, however, is that they are necessary for determining grammatical arguments. In this way thematic theory, or theta-theory, seeks to characterize possible predicates in overt syntax. The central question is how thematic relations and grammatical arguments correspond – the linking problem of argument projection. Linking regularities have been propounded and described in terms of the Universal Alignment Hypothesis (Perlmutter and Postal 1984), the Uniformity of Theta Assignment Hypothesis (Baker 1988, 1996), linking rules and hierarchies (Carter 1988, Jackendoff 1990b), and projection asymmetries (Gruber 1994, 1997).

(1a) is a prime example of an asymmetry in linking: the Agent is expressed as subject and the Patient/Theme as object, and not the reverse. Thus there

can be no verb like *bestroy* as in (2a), with the meaning of *destroy* but with Patient/Theme as subject and Agent as direct object. If Agent is a kind of Source, (1b) illustrates, in part, the same asymmetry: Source can be subject but not object. Note that the apparent Source object of *leave* in (2b) cannot become the subject of a passive (2c):² it is perhaps rather an implicit prepositional (*from*) phrase. In contrast, (1c) does passivize (2d), showing that a Goal can be a direct object (see section 1.4):

- (2) a. *The house destroyed John.
 b. Ions left the electrode.
 c. *The electrode was left by ions.
 d. The electrode was struck by ions.

In the remainder of this section we discuss the information content of simple thematic structures and some projection asymmetries involving them. Complex thematic structures and the significance of aspect are discussed in section 2. The locus of thematic information and the “grain” of theta-role projection are considered in section 3, and the derivation of linking asymmetries in section 4.

1.1 *Elemental thematic functions*

Asymmetries of argument projection show the need to represent conceptual distinctions in a relational system that will appropriately map to syntactic form. Theta-roles are not feature like, constituting arbitrary, lexically specific sets or theta-grids (Stowell 1981, Marantz 1984). Rather they are defined in fixed elemental functions (Gruber 1965, 1994, 1997, Jackendoff 1976, 1987, 1990b).

(1) and (3) illustrate two simple types of thematic function. In a Locational function, (1d) and (3a), there are two thematic roles, Theme Θ and Location Λ . These are defined in relation to each other: viz., the denotation of the Theme is found in that of the Location. In a Motional function, (1a–c) and (3b), there are three roles, Theme, Source Σ , and Goal Γ . The Source has the sense of a preceding Location and the Goal a subsequent one. These are then “Locational” roles, defined by their relation to a Theme and a sequential relation to each other:

- (3) a. The ball lies in the box. $\langle \Theta, \Lambda \rangle$
 b. The ball rolled from the bush to the tree. $\langle \Theta, \Sigma, \Gamma \rangle$

Thus thematic theory is a theory not only of possible overt syntactic predicates, but of conceptual predicates: these must be based on the elemental Theme–Location relation. Conceptual predicates of arbitrary argument structure cannot be hypothesized. For example, the “subject” of the predicate CAUSE must be analyzed as a Source whose Theme is the Causee clause.

Various ways that theta-roles can correspond to grammatical arguments are shown in (4). In the notation, theta-roles of a function are arrayed on a

horizontal line under the grammatical arguments that express them.³ A vertical stroke marks the lexical predicate head. A Locational function may be expressed intransitively (4a) with Theme subject, or transitively (4b) with Location subject and Theme object. A Motional function may be intransitive with Theme subject (4c), or transitive with Source subject and Theme object (4d), or Theme subject and Goal object (4d):

- (4) a. The ball lies in the box.
 $\Theta \quad \quad \quad | \quad \quad \quad \Lambda$
 b. The box contains the ball.
 $\Lambda \quad \quad \quad | \quad \quad \quad \Theta$
 c. The ball rolled from the bush to the tree.
 $\Theta \quad \quad \quad | \quad \quad \quad \Sigma \quad \quad \quad \Gamma$
 d. The tree dropped fruit to the ground.
 $\Sigma \quad \quad \quad | \quad \quad \quad \Theta \quad \quad \quad \Gamma$
 e. Fruit hit the ground from the tree.
 $\Theta \quad \quad \quad | \quad \quad \quad \Gamma \quad \quad \quad \Sigma$

Elemental thematic functions may be combined into complex structures. Non-agentive resultatives provide clear examples. As shown in (5), resultatives consist of Motional functions combined in a relation of consequence (CSQ). The functions are shown stepwise with the precedent one below the consequent one. (Implicit Source is omitted.) In both sentences the precedent function means “the stone hit the pole,” where “the stone” is Theme and “the pole” Goal. In (5a) the consequent function means “the stone entered the road,” with “the stone” Theme and “the road” Goal. In (5b) the consequent function signifies “the pole entered the road,” with “the pole” Theme and “the road” Goal. Note that in each resultative, a theta-role of each function is linked, or “colinked,” to the same grammatical argument:

- (5) a. The stone knocked against the pole into the road.
 $\Theta \quad \quad \quad | \quad \quad \quad \Gamma$
 $\Theta \quad \quad \quad | \quad \quad \quad \Gamma$ CSQ
 (The stone hit the pole and the stone entered the road.)
 b. The stone knocked the pole into the road.
 $\quad \quad \quad \quad \quad | \quad \quad \quad \Theta \quad \quad \quad \Gamma$
 $\Theta \quad \quad \quad | \quad \quad \quad \Gamma$ CSQ
 (The stone hit the pole and the pole entered the road.)

1.2 Thematic functional integrity

Since theta-roles are defined relationally within thematic functions, each theta-role of a function is always present conceptually. A Theme entails a Location and vice versa. A Goal entails a preceding Location, hence a Source; a Source entails a following one, hence a Goal. Thematic functions thus maintain their

relations of physical position, while *hit* and *drop* involve contact. These are of the Positional and Contact dimensions, respectively. *Change* concerns category identification and is termed Identificational. In the following examples of various dimensions, the subject appears to be Theme and the object or complement Goal, while Source is implicit:

- | | | |
|--------|--|------------------------|
| (8) a. | The train reached the station. | Positional (PST) |
| | Θ _____ PST _____ Γ | |
| b. | The branches knocked against the wall. | Contact (CTT) |
| c. | The child became a man. | Identificational (IDT) |
| d. | The party lasted till midnight. | Temporal (TMP) |
| e. | The dog went crazy. | State (STE) |
| f. | It struck John that it was so. | Propositional (PRP) |
| g. | It came to John that it was so. | Informational (INF) |
| h. | The snake saw into the nest. | Sensory (SNS) |
| i. | Hard work resulted in high grades. | Causational (CST) |
| j. | The farm passed to John. | Possessional (PSS) |

The integrity of thematic functions applies in abstract dimensions. *Strike* (8f), *impress on*, and *believe* are Propositional, involving the holding or transferring of propositional attitudes. (9a, b) accept *gradually/at once*, and so are Motional functions. An oblique Source occurs in (9a), so that the direct arguments are Theme and Goal. An oblique Source cannot occur in (9b) because the subject is Source. Neither the adverbs nor an oblique Source can occur with a Locational function (9c):

- | | | |
|--------|--|--|
| (9) a. | It ^s (gradually) struck John (from the dog's appearance) that [_s it had eaten the roast]. | |
| | Θ _____ PRP _____ Γ _____ Σ | |
| b. | The way it moved (gradually) impressed on John that [_s . . .] (*from its appearance) | |
| | _____ Σ _____ PRP _____ Γ _____ Θ | |
| c. | John (*gradually) believed (*from the dog's appearance) that [_s . . .] | |
| | Λ _____ PRP _____ Θ | |

Essential for a falsifiable theory is the identification of thematic roles by meaning alone. This entails a universal characterization of the set of conceptual dimensions together with a definition of thematic relation independent of any particular dimension. Suppose each dimension determines a space of variable values in which the image of a category is defined. Let us call this its denotation in the conceptual space. The elemental Theme–Location relation then signifies that the denotation of the Theme in some space is found in that of the Location: that is, it asserts a mapping from Theme, as independent variable, to Location. This is a concretization of the Theme–Location relation as figure–ground (Talmy 1978). Thus the Positional dimension would determine

(ordinary) physical space. In the Locational function (4a, b), “the ball,” a Physical Object, denotes the set of variable values (positions) defining the space occupied by the ball, and “(in) the box” denotes the space occupied by (the inside) of the box. The function means that the space of the Theme maps into that of the Location. Similarly, the Propositional dimension in (9) could determine a space of (truth) conditions, such that the denotation of a clause is the set of conditions under which it is true, while the denotation of an Animate being is the set of conditions it holds true. (9c) asserts that the conditions under which “it had eaten the meat” is true maps into those that John holds true. The clausal argument is thereby identified as Theme and the Animate subject as Location.

Possessional conceptual dimensions contrast with Spatial ones in that they have no independently defined conceptual space. The denotation of the Theme in the thematic relation is the Theme itself. While the change of the Positional space of an entity, i.e., its position, is Spatial, as in (8a), the transfer of the entity itself, such as landed property in (8j), is Possessional. Propositional predicates (8f) are Spatial, while Informational predicates (8g) are Possessional. The latter express the holding or transfer of information denoted directly by the clausal Theme, not as denoted in an independent conceptual space (such as truth conditions).

1.4 *Projection asymmetries of simple thematic functions*

Locational and Motional functions exhibit projection asymmetries in which their theta-roles correspond differently to grammatical arguments. For Locational functions, the Location is either subject or an oblique complement, but never a direct object. In contrast the Theme is either subject or object, but not normally an oblique complement. The two possible predicate forms are as illustrated in (4a–b). We may state the asymmetry as in (10):

(10) **The Location–Theme Subject–Object Asymmetry**

For a predicate expressing a simple Locational eventuality:

- a. if the predicate is transitive, the Location is subject and the Theme is direct object;
- b. if the predicate is intransitive the Theme is subject and the Location is oblique.

This asymmetry, as well as those that follow, is valid only for predicates that express truly simple thematic functions, and are truly transitive or intransitive as indicated. Therefore apparent counter-examples must be carefully considered. These are illustrated in (11) for the half of the asymmetry concerned with transitive predicates (10a). First of all, an apparent Location object may be an implicit oblique, as in (2b) and (11a), where the verb cannot be passivized. Second, the predicate may express more than a simple thematic function. For

example, it may be agentive (11b), in which a theta-role is colinked with Agent in the subject (section 2.2); or the object may express colinked theta-roles (11c) (section 2.1). Other apparent exceptions occur when the theta-role of the object is misidentified: for example, it may be a Goal (11d) or Path (11e):⁹

- (11) a. The chair abuts the wall/*the wall is abutted by the chair.
 b. John is touching the wall/the wall is being touched by John.
 c. A bear occupies/inhabits the cave (cf. water fills the tub).
 d. The electric main joins the house circuit in the basement/the house circuit is joined by the electric main in the basement.
 e. The fence straddles the sidewalk/the sidewalk is straddled by the fence.

An exception to the intransitive half of the Location–Theme asymmetry (10b) is an oblique attributive Theme (12a). The form is marginally used predicatively (12b):¹⁰

- (12) a. The man with a book.
 b. ?The man is with a book.

Source and Goal of simple Motional functions also enter into a projection asymmetry. When projected directly, Source becomes subject and Goal object. We may state this as (13):

(13) **The Source–Goal Subject–Object Asymmetry**

For a predicate expressing a simple Motional eventuality, either:

- a. the subject is Theme and the Source and Goal are oblique, or
 b. the direct object is Theme, with Source as subject, or
 c. the direct object is Goal, with Theme as subject.

(4c–d) show the three predicate forms of a simple Motional function allowed by (13). Source subject transitives (13b) include causatives and production verbs like *cause*, *produce*, *derive*, and verbs of the Substance/Source alternation (14a, Levin 1993). Goal object forms (13c) are *reach*, *join*, *see*, *regard*, *conclude*, *realize*, *notice*, and verbs of contact with intransitive alternates (14b):

- (14) a. *drop*, *drip*, *leak*, *gush*, *ooze*, *sprout*, *shine*, . . .
 The tree dropped fruit onto the rooftop/fruit dropped from the tree onto the rooftop.
 b. *hit*, *strike*, *slap*, *kick*, *rub*, *touch*, . . .
 Fruit hit the rooftop from the tree/fruit hit against the rooftop from the tree.

Apparent counter-examples to the asymmetry with respect to Source (13b) are shown in (15). A Source appearing to be object but without a passive is an implicit oblique (15a). The Source may be object if the predicate is agentive (15b). A Path role can be projected as a direct object (15c):

- (15) a. Gas escaped the tube/*the tube was escaped by gas.
 b. The terrorist escaped the prison cell/the prison cell was escaped by the terrorist.
 c. The rolling stone avoided the river/the river was avoided by the rolling stone.

Apparent counter-examples to the asymmetry with respect to Goal (13c) are shown in (16). A Goal subject is possible if the predicate is agentive (16a), or complex (16b). The asymmetry implies that the Theme in a simple Motional cannot be oblique. An apparent exception is *fill* (16c), in which Goal also appears as subject. But this is again a complex structure with another Theme colinked in the subject (section 2.1). The verbs in (16d) have Goal subjects but are of the type characterized as “Possessional,” which naturally projects Goal as subject:

- (16) a. The agents caught the terrorist.
 b. The sponge soaked up the water.
 c. The tub filled with water.
 d. John received a book/learned a lesson.

In Possessional Motional predicates, as opposed to Spatial ones, Goal as a direct argument behaves like Source, projecting as subject rather than object. We may state this asymmetry as in (17):

- (17) **The Possessional–Spatial Subject–Object Asymmetry**
 For a predicate expressing a simple Motional eventuality:
 a. if the verb is Spatial a Goal may be object but not subject;
 b. if the verb is Possessional a Goal may be subject but not object.

For example (cf. Jackendoff 1990b, Carter 1988), there is neither a verb like *bereach* with the Spatial (Positional PST) meaning of *reach*¹¹ but with Goal subject (18a, b), nor a verb like *acceive* with the Possessional (PSS) meaning of *receive* but with Goal object (18c, d). (See section 4.5, Gruber 1996.) *Get to* (19) has meaning similar to *reach*, but only *get to* with oblique Goal, not *reach* with Goal object, can be Possessional in sense:

- (18) a. The parcel reached John.
 Θ _____ PST| Γ
 b. *John bereached the parcel.
 Γ _____ PST| _____ Θ
 c. John received the parcel.
 Γ _____ PSS| _____ Θ
 d. *The parcel acceived John.
 Θ _____ PSS| _____ Γ

- (19) The farm finally got to/*reached John after much litigation.

2 Complex Thematic Structures

2.1 Resultative structures and asymmetries

The resultatives in (5) express complex structures combining elemental thematic functions in a sense of consequence. Colinking between such functions appears to be obligatory. In (5a) the Theme of the precedent Contact function is colinked with the Theme of the consequent Positional function in the subject: Theme;Theme colinking (Θ ; Θ). In (5b) the precedent Goal is colinked with the consequent Theme in the object: Goal;Theme colinking (Γ ; Θ).

The particular function to which a theta-role belongs is significant for argument projection. Of the numerous logical possibilities for obligatory colinking amongst resultative structures, only five occur, three in addition to (5). One constraint is that the obligatorily colinked role of the consequent function or subevent must be Theme. Various asymmetries also have an effect. A Source–Goal asymmetry like (13) applies to roles of the precedent subevent (precedent roles) in a resultative (20). (20a) allows (5b), similar to (21a). (20b) allows (21b). (21c) and (d) are disallowed:

(20) The Source–Goal Subject–Object Asymmetry in Resultatives

When theta-roles are colinked in the object of a simple (non-agentive) resultative, then:

- a. the precedent role expressed in the object can be Goal, but not Source;
- b. the precedent role expressed in the subject can be Source, but not Goal.

- (21) a. Water filled the cup (high).

$$\begin{array}{c} \text{STE} | \quad \quad \Theta \quad \Gamma \\ \hline \Theta \text{ PST} | \quad \quad \Gamma \end{array}$$

(Water entered the cup and the cup became filled up high.)

- b. The cup leaked water free.

$$\begin{array}{c} \text{STE} | \quad \Theta \quad \Gamma \\ \hline \Sigma \text{ PST} | \quad \Theta \end{array}$$

(Water left the cup and became free.)

- c. *Water emptied the cup.

$$\begin{array}{c} \text{STE} | \quad \quad \Theta \\ \hline \Theta \text{ PST} | \quad \quad \Sigma \end{array}$$

(Water left the cup and the cup became empty.)

- d. *The cup filled the water high.

$$\begin{array}{c} \text{STE} | \quad \quad \Theta \quad \Gamma \\ \hline \Gamma \text{ PST} | \quad \quad \Theta \end{array}$$

(Water entered the cup and the cup became filled up high.)

The above exhausts the possibilities amongst the roles Θ , Σ , and Γ for obligatory colinking in the object of simple resultatives. In the subject, besides Θ ; Θ

colinking (5a), there are $\Gamma;\Theta$ and $\Sigma;\Theta$ colinking (22). This exhibits another Source–Goal asymmetry (23), noted by Talmy (1985). Note that while there are contrasted transitive/intransitive predicates for Goal colinked with Theme (21a, 22a), there is only the intransitive predicate for Source (21c, 22b).

- (22) a. The cup filled with/*of water.

$$\begin{array}{c} \Theta \text{ STE|} \\ \Gamma \text{ PST|} \quad \Theta \end{array}$$

(Water entered the cup and the cup became full.)

- b. The cup emptied of/*with water.

$$\begin{array}{c} \Theta \text{ STE|} \\ \Sigma \text{ PST|} \quad \Theta \end{array}$$

(Water left the cup and the cup became empty.)

(23) **The Source–Goal Oblique Theme Asymmetry**

In simple (non-agentive) resultative structures, if a precedent role colinked in the subject is:

- a. Goal, the precedent Theme has instrumental/comitative-like Case (*with*); if
- b. Source, the precedent Theme has genitive-like Case (*of*).

This completes possible linkages in non-agentive resultatives. An aspectual asymmetry among these (24) distinguishes colinking in subject or object, illustrated in (25) and (26) respectively. In (25a) with $\Gamma;\Theta$ colinking in the subject, a continuous subevent “logs piling onto the barge” precedes the consequent one, “the barge becoming ‘high’ with logs.” This is impossible with colinking in the object (26a). In contrast, in (26b) with $\Gamma;\Theta$ colinking in the object, a punctual subevent “a stone entering the road” precedes the consequent one “the road becoming blocked,” impossible with subject colinking (25b). For $\Sigma;\Theta$ subject colinking, the precedent subevent is relatively continuous (25c), not punctual (25d). For $\Theta;\Theta$ object colinking, the precedent subevent is relatively punctual (26d), not continuous (26c):

(24) **The Aspectual Colinking Subject–Object Asymmetry**

In simple (non-agentive) resultative structures:

- a. the precedent subevent is multi-staged (an iterated or continuous process) relative to the consequent subevent if colinking is in the subject;
 - b. the precedent subevent is single-staged (punctual) relative to the consequent subevent if colinking is in the object.
- (25) a. the barge piled high with logs (\approx 22a)
 b. *the road blocked with a stone
 c. the bottle drained empty of liquid (\approx 22b)
 d. *the branch dropped bare of its apple

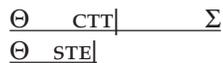
- (26) a. *the logs piled the barge high
 b. a stone blocked the road (\approx 21a)
 c. *the bottle drained the liquid free
 d. the branch dropped its apple free (\approx 21b)

If projected as a direct argument, a role from a precedent subevent becomes subject while a role of the consequent subevent becomes object. The relevant asymmetries may be stated as (27). The precedent role subject condition (27a) is illustrated in the above examples.¹² The subject may express a precedent role that is colinked (5a, 22a, b) or not (5a, 21a, b). But it cannot express an uncolinked consequent role. The thematic structure acceptably expressed in (28a) cannot be expressed with the consequent Source as subject (28b). This is so even though the Source can be expressed this way if the thematic structure is simple (28c). Thus a verb may have alternate projection patterns, such as the Contact predicate *CTT* in (28d, e); but adding a precedent subpredicate, e.g. <*PST*>, is acceptable only for the alternate for which this results in obligatory colinking in the subject (28d):

(27) **Precedent–Consequent Theta-role Asymmetries**

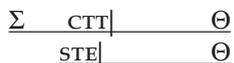
- a. **Precedent Role Subject Condition:** The subject must project a theta-role of the most precedent subevent.
 b. **Consequent Role Object Condition:** A direct object must project a theta-role of the most consequent subevent.
 c. **Consequent Role Complement Condition:** A complement argument is projected with respect to its most consequent role.

- (28) a. Some branches broke off of the tree.



(Some branches broke and fell off the tree.)

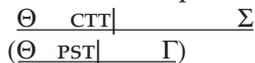
- b. *The tree broke off some branches.



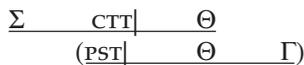
- c. The tree dropped/lost some branches.



- d. Water bubbled (up) out of the kettle.



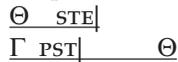
- e. The kettle bubbled water (*up) (* = d).



The consequent role object condition (27b) means that in a linking pattern like (22a), the complement role, even though Theme, cannot be expressed as

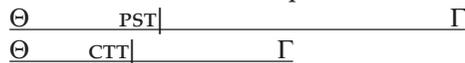
direct object (29a). This is because it is of the precedent subevent. Similarly in an event structure like (5a) the precedent Goal cannot be expressed as object (29b). A consequent subpredicate may be added to an event structure in such a way that an erstwhile object role is no longer most consequent. In that case it ceases to be projectable as object (29c), and is projected obliquely (d). This is the essence of the locative alternation in lexical causatives:

- (29) a. *The cup filled water.



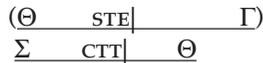
(* = Water entered the cup and the cup became full.)

- b. *The stone knocked the pole into the road.¹³

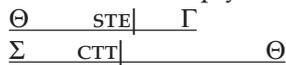


(* = The stone hit the pole and went into the road.)

- c. The tub leaked water (*empty).

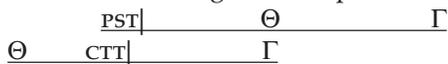


- d. The tub leaked empty of water.



The consequent role complement condition (27c) states that oblique complements as well as objects will be projected with respect to their most consequent role. This has been observed by Jackendoff (1990), referring to the least embedded or “dominant” theta-role. It covers such facts as why a colinked precedent Goal in a thematic structure like (5b) cannot be projected semantically (30). That is, in the precedent subevent of (30), “the pole” is a Goal, which in itself can be realized as the complement of “against,” as in (5a). In the consequent subevent of (30), however, “the pole” is a Theme, which cannot be so realized. The theta-role of the consequent subevent prevails:

- (30) *The stone knocked against the pole into the road.



(* = The stone hit the pole and the pole entered the road.)

2.2 Causative structures and asymmetries

The thematic structure of a lexical causative (31b) differs from that of a resultative (31a). The subject of a causative, not a resultative, is expressible obliquely as a *from*-phrase (31c, d). It is Source in a matrix Causational function (cst), i.e., a Cause, whose Theme is the Causee function or predicate as a whole. The Goal of the Causational function, the Patient, appears in a *do*

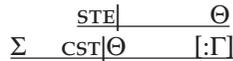
to paraphrase (31f). It is colinked with the theta-role of the Causee function that is projected as object, Theme in (31b). This follows if the matrix function CAUSE, like the verb *cause*, content-identifies Theme with Goal [Γ], hence Goal with the Causee function and with the theta-role that raises out of it to object. This role is usually Theme but may be any role (see examples 34b, d). In this way also lexical causatives differ from resultatives, since in the latter the consequent obligatorily colinked role is always Theme:

- (31) a. Hail stones broke the window.



(Hail stones struck the window and it broke.)

- b. The force of the wind broke the window.



(The force of the wind caused the window to break.)

- c. *The window broke from hail stones.
 d. The window broke from the force of the wind.
 e. ?What hail stones did to the window was break it.
 f. What the force of the wind did to the window was break it.

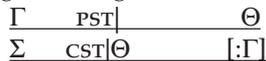
The overall structure of a Causational predicate is that of a simple Motional. The subject–object asymmetry between Agent and Patient (1a/2a, 32) then falls under the generalization (13b) about simple Motional predicates. If projected directly, the Cause/Agent (Source) projects to subject while a theta-role of the Causee (Theme) predicate, identified as Patient, projects to object. Otherwise, falling under the generalization (13a), if the Cause is projected obliquely, a theta-role of the Causee predicate, now the main clause, projects to subject, as in (31d):

(32) **The Agent–Patient Subject–Object Asymmetry**

In an agentive (causative) transitive predicate the Agent (Cause) is projected as subject while the Patient is projected as object.

Common agentive verbs have Cause or Agent colinked in the subject with some theta-role of the Causee predicate. This “incidental” colinking seems to be free with lexical specification, and obviates all projection asymmetries except the Agent–Patient asymmetry itself. Thus, that Spatial Goal cannot be projected to subject can be violated if the subject is also Agent (33a). Violations affecting the object are also rendered acceptable if the verb is agentive, e.g. the object of a simple Motional transitive can be a Source (33b, cf. 15a):

- (33) a. The agents caught the terrorist.



- b. The terrorist escaped the prison cell

$$\frac{\Theta \quad \text{PST} \mid \quad \Sigma}{\Sigma \quad \text{CST} \mid \Theta \quad [:\Gamma]}$$

/the prison cell was escaped by the terrorist.

The lexical causative of a simple Motional predicate exhibits an oblique Theme alternation. Either the Theme is object with oblique Goal or Source (34a, c), or Goal or Source is object with oblique Theme (34b, d). These correspond to semantic or direct Goal/Source in the lexically related non-causative. The Case of the oblique Theme depends on whether Goal or Source is direct, as in the resultative oblique Theme asymmetry (23). In contrast, the lexical causative of a Locational predicate shows no alternation. The Location is semantic in the causative, regardless of whether semantic (34e) or direct (34f) in the related non-causative. The asymmetries are summarized in (35) and (36):

- (34) a. John hit the stone against the wall.

$$\frac{\text{CTT} \mid \quad \Theta \quad \Gamma}{\Sigma \quad \text{CST} \mid \Theta \quad [:\Gamma]}$$

(cf. The stone hit against the wall.)

- b. John hit the wall with the stone.

$$\frac{\text{CTT} \mid \quad \Gamma \quad \Theta}{\Sigma \quad \text{CST} \mid \Theta \quad [:\Gamma]}$$

(cf. The stone hit the wall.)

- c. John tapped some wine from a barrel.

$$\frac{\text{CTT} \mid \quad \Theta \quad \Sigma}{\Sigma \quad \text{CST} \mid \Theta \quad [:\Gamma]}$$

(cf. Water dripped from the bottle.)

- d. John tapped a barrel of some wine.

$$\frac{\text{CTT} \mid \quad \Sigma \quad \Theta}{\Sigma \quad \text{CST} \mid \Theta \quad [:\Gamma]}$$

(cf. The bottle dripped some water.)

- e. John laid the book on the table.

$$\frac{\text{PST} \mid \quad \Theta \quad \Lambda}{\Sigma \quad \text{CST} \mid \Theta \quad [:\Gamma]}$$

(cf. The book lay on the table.)

- e' *John laid the table with the book.

- f. John included his name in the list.

$$\frac{\mid \quad \Theta \quad \Lambda}{\Sigma \quad \text{CST} \mid \Theta \quad [:\Gamma]}$$

(cf. The list included his name.)

- f' *John included the list with his name.

(35) **The Locational–Motional Lexical Causative Asymmetry**

For the lexical causative of a transitive verb expressing a simple thematic function:

- a. if Locational, the Location is oblique (semantic), while the Theme is object;
- b. if Motional, the Goal or Source is object, while the Theme is oblique.

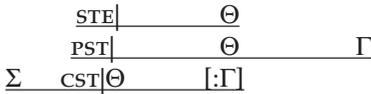
(36) **The Source–Goal Oblique Theme Asymmetry in Lexical Causatives**

For the lexical causative of a simple transitive Motional, if the role projected directly is:

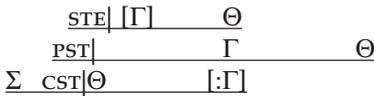
- a. Goal (erstwhile object), the Theme has instrumental/comitative-like Case (*with*); if
- b. Source (erstwhile subject), the Theme has genitive-like Case (*of*).

The causative Motional alternates (34a, b) and (34c, d) mean the same except for the object role colinked with Patient. The so-called locative alternation (37) exhibits the further difference that the object role is colinked with an “affected Theme.” This is the Theme in a consequent function expressing a change of state, often completeness. The structure is that of the lexical causative of a resultative:

- (37) a. John loaded the bricks onto the truck.

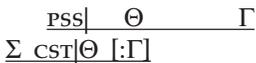


- b. John loaded the truck with bricks.



The need for a precedent Theme to appear obliquely in (37b) reflects the operation of the consequent role object condition (27b) applied to causatives. In this respect the “dative alternation” (38a, b) is similar to the causative Motional alternation (34a, b) rather than the locative alternation (37). In the former two, (38b) the “double object construction” and (34b), the Goal of the Causee function is projected directly as object. The double object construction, restricted to Possessionals in English, differs only in that the Theme of this function is also projected directly. (38c, d) also demonstrate the consequent role object condition: an erstwhile second object Theme $\Theta(\text{pss})$ must be projected obliquely if a consequent function is added, creating a resultative causative structure:

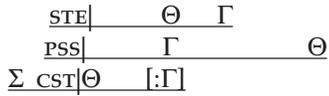
- (38) a. John fed rice to the baby.



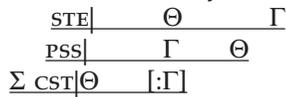
- b. John fed the baby rice.



- c. John fed the baby up with rice.



- d. *John fed the baby rice up.



2.3 Aspect and affectedness

Tenny (1989, 1994) proposes the relevance of aspect in argument projection, associating “affectedness” with direct objects. But aspect and thematic relations are inseparable facets of event structure. In particular, affectedness, or the measuring out of an event, is a property of the Theme of the most consequent function. This reflects the significance of the Theme as the independent variable in a thematic relation, as discussed in 1.3. The extent of its involvement in a mapping is a measure of the completeness of the event itself. The extent of the involvement of the Locational role, however, as the dependent variable is irrelevant in measuring out the event.

Theme and Locational role are distinguished as independent and dependent variables by event-measuring adverbs like *completely*, *fully*, *half(way)*. These measure the extent the eventuality is effected or the Theme is involved, but not how much the Locational role is. In (39a, b) *completely* applied to the eventuality means “all the way into the box,” making reference to the Locational role. Applied to Theme it means “the whole [Theme],” i.e., “the whole ball.” But it does not apply specifically to the denotation of the Locational role, meaning “the whole (inside of the) box:”

- | | | |
|---------|---------------------------------------|--|
| (39) a. | The ball lies completely in the box. | } (= the whole ball/
*box/all the way into
the box) |
| | (≈ 4a, b) | |
| b. | The box completely contains the ball. | |
| c. | The train got to the station fully. | } (= the whole train/
*station/all the way
to the station) |
| | (≈ 4c, e) | |
| d. | The train reached the station fully. | |

These observations are consistent with Tenny’s association of a Theme object with an aspectual role that measures out the event, while a Goal, a Locational role, expresses its terminus. They hold, however, with reference to thematic roles independent of grammatical form. In (39a, b), *completely* applied to Theme “the ball” means “the whole ball,” whether subject or object; with reference to Location “the box” it means “all the way into the box,” whether subject or oblique. Similarly, in a simple Motional predicate (39c, d), *fully* applied to

Theme means “the whole train,” while with reference to Goal it means “all the way to the station,” whether object or oblique.¹⁴ In the lexical causative of a simple Motional (40a, b), the interpretations of *completely* are also the same whether with reference to a direct or oblique argument: for Theme it is “the whole stamp;” for Goal it is “all the way against the pad,” not “the whole pad.” Interpretations of measure adverbs do appear to vary with grammatical form for the causative of a resultative (40c, d), however. This is the locative alternation. Here it is consistently the object to which the adverb applies, since this represents the colinked Theme of the most consequent subevent in a complex thematic structure. Similarly the adverb does not apply to any of the oblique arguments. In particular it does not apply to the oblique Theme in (40d) because this role is of a precedent subevent:

- | | | |
|------|--|---|
| (40) | a. Press the stamp against the pad completely.
(≈ 34a, b) | } (= the whole stamp/
*pad/all the way
against the pad) |
| | b. Press the pad with the stamp completely. | |
| | c. Spray the paint onto the wall completely.
(≈ 37a, b) | } (= all the paint/*the
whole wall) |
| | d. Spray the wall (red) with the paint
completely. | } (= the whole wall/
*all the paint) |

It is thus principally resultative structures with consequent Theme objects to which the association of affectedness and direct objects pertains. In the causative of a simple Motional an object may not be affected in the sense that it measures out the event, while an oblique may be affected in this sense. Therefore there is no separate module that assigns aspectual properties to an object. Rather the most consequent Theme has these properties.

Patient colinking is associated with affectedness because it is obligatory for the object of a causative or agentive verb. However, it is a distinct phenomenon, independent of the affectedness of a Theme object. Thus, while the object in the locative alternation will be both affected and a Patient (41a), a Goal object of a Motional causative will be a Patient, but not affected (41b). Finally, non-causative Motionals and resultatives provide examples of direct objects that are affected, being the most consequent Theme, but are not Patients (41c), or are neither Patients nor affected (41d):

- | | | |
|------|---|------------------------|
| (41) | a. What John did to the wall (completely) was
spray it. (≈ 37b) | } (= the whole wall) |
| | b. What John did to the wall (completely) was
hit it. (≈ 34b) | } (* = the whole wall) |
| | c. *What the water did to the bottle
(completely) was fill it. (≈ 21a) | } (= the whole bottle) |
| | d. *What the stone did to the wall (completely)
was hit it. (≈ 4e) | } (* = the whole wall) |

3 Grain and the Locus of Thematic Representation

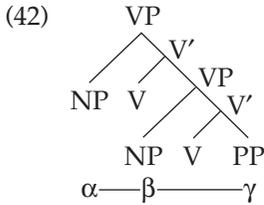
The projection asymmetries are couched in an elaborate system of thematic structure. Does this structure map into a correspondingly elaborate initial representation in grammatical syntax, or is the correspondence relatively coarse grained with a comparatively impoverished initial syntax? There are two ways for the latter to be possible. One way is that the mapping is of prototypical theta-roles or “proto-roles”: theta-roles are grouped in “fuzzy” sets of similar roles (Dowty 1991) that map to particular syntactic positions. The other way is that linking is relative: theta-roles are prioritized, perhaps in a hierarchy, to be expressed in more prominent syntactic positions relative to others. The two parameters of correspondence – discrete or prototypical theta-roles, relative (including hierarchical) or absolute mapping – provide for at least three types of linking theory:

	<i>Relative/Discrete</i>	<i>Absolute/Prototypical</i>	<i>Absolute/Discrete</i>
Initial syntactic form	Arguments	Impoverished	Elaborated
Computation	Semantic projection	Syntactic projection	Syntactic projection

A third parameter is the degree of computation between initial syntactic level, at which theta-roles directly correspond, and a surface (or interface) level where grammatical arguments appear. However, this follows from relative or absolute correspondence. The former (Foley and Van Valin 1984, Bresnan and Kanerva 1989, Grimshaw 1990, Jackendoff 1972, 1990b) allows semantic projection, i.e., less syntactic computation. There is therefore comparatively direct correspondence between theta-roles and grammatical arguments. The latter (Baker 1988, 1997b, Hale and Keyser 1993) allows an impoverished initial structure. But this requires syntactic argument projection, i.e., more syntactic computation, because theta-roles simply do not have unique surface argument positions. For example, by the Unaccusative Hypothesis (Perlmutter 1978), the absolute position of Theme must be an initial one, since its surface position differs in intransitives and transitives. Both absolute and discrete correspondence (Gruber 1994, 1997, Gruber and Collins 1997), requires fine-grained linking and elaborated initial structure. Here syntactic computation is needed to derive the less elaborate grammatical argument structure.

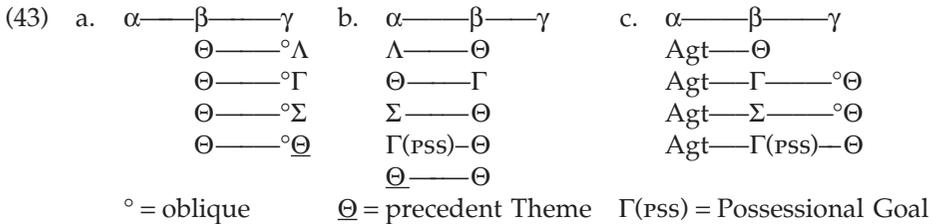
The questions then are whether linking can be relative, or can be prototypical. If not, an impoverished initial syntactic structure, such as a “VP-shell” (42), is not representationally adequate: a multiplicity of discrete roles all need unique positions. Suppose prototypically distinctive theta-roles α , β , γ (say, Agent,

Patient/Theme, Goal/Location) correspond to positions in the shell. This would be inadequate, i.e., structural elaboration would be necessary, if it is shown that (i) three such sets are not sufficient to describe linking regularities; and (ii) any such sets may not correspond relativistically (i.e., as a hierarchy):



3.1 Discrete roles

The projection asymmetries show that thematic relations must be represented in syntax discretely rather than prototypically. They place theta-roles in the VP-shell positions α , β , γ of (42) as in (43). Each position contains a variety of theta-roles that is inconsistent as a prototype. For example, both α and β contain both Themes and Locational roles. Thus contrary to what is often supposed, Locational roles cannot be said to occupy the same initial position γ as part of the same protorole, since Themes also appear there. On the other hand asymmetries referring to these roles, particularly Source and Goal (13, 20, 23), show that their discreteness is significant for syntax:



While proto-role groupings are not consistent with the projection asymmetries, discrete theta-roles can nearly be accommodated in a VP-shell under a relativized mapping. This is possible for the inner subject and object positions in terms of generalized relative precedence in event structure, defined abstractly. That is, the role in α is precedent to that in β : precedent Theme relative to consequent Theme, Source to Theme, Theme to Goal, Location as ground to Theme (43b), and Agent as Source to Patient colinked with any role (43c). Precedence fails for Possessional (pss) Goal¹⁵ at α in non-agentives (43b), and at β in double object constructions (43c).

Relative precedence does not qualify as a way to define a prototype. Sometimes, members of proto-roles are ranked as “better examples” to prioritize them as arguments. This in essence acknowledges the necessity for discrete roles. For example, Instrument might be part of the same proto-role as Agent,

a proto-agent, and so prioritized for subject before (consequent) Theme. But Agent, which becomes subject before Instrument, must be regarded as a better proto-agent. This is the same as saying Agent and Instrument are discrete roles in a hierarchy of agentivity.¹⁶

3.2 *Absolute correspondence and properties of initial positions*

Absolute correspondence between theta-roles and syntactic positions, as opposed to relative correspondence, is not directly motivated by projection asymmetries. Traditionally, distinctions in syntactic behavior between unaccusative and unergative intransitives (see Levin and Rappaport 1995) argue against relative correspondence. A single initial syntactic position for prioritized theta-roles cannot explain these differences. They may, however, be attributable to conceptual structures apart from grammatical syntax (as in Jackendoff 1990b). A classic example is *ne*-cliticization out of quantified nominals in Italian. It is allowed only for objects and postverbal unaccusative subjects (Belletti 1988, Belletti and Rizzi 1981). This suggests these arguments are initially in the same position and lower than subjects of transitives or unergatives. Their theta-roles, Patient/Theme and Agent respectively, then correspond to unique positions before movement. But the differences could also be attributed to configurations of conceptual structure related to syntax by correspondence rules.¹⁷ Moreover, the unaccusative/unergative distinction motivates absolute correspondence only for prototypical Agent and Patient/Theme.

Direct and unequivocal evidence for multiple discrete theta-roles comes from properties attributable to constant initial positions. In particular, Themes exhibit properties reflecting an initial innermost complement position, while Locational roles show they are determined in an innermost specifier.¹⁸ Clausal arguments of verbs which allow raising to subject or exceptional Case-marking (raising to object) seem to be Themes, while verbs with clausal arguments that are Locational roles do not (44). This reflects an initial complement position for Theme, from which raising is possible, and an initial specifier position for Locational roles, out of which raising is not:

- (44) a. John took Bill [t to be a fool].
 Γ/Λ | Θ
 / . . . *accept, understand, perceive; hold, believe*
- b. *John concluded Bill [t to be a fool].
 Θ | Γ
 / . . . *see, realize, notice*

Depictive predicates consistently refer to the most consequent Theme rather than, say, a direct object. This is so, for example, in both forms of the dative alternation (45a, b) (Bowers 1993a, Hale and Keyser 1997), as well as for the alternate forms of the Motional causative (45c, d). However, in the resultative causative (e) only the consequent Theme object can be referred to by the

depictive. These facts indicate a constant initial position for the Theme. Indeed, given that the initial position of the Theme is a complement, its first move will be to the immediately higher functional specifier position accessible only to Theme. Such a position must in fact be involved in colinking, hence plausibly a position identified with the subject of the depictive predicate (see Section 4.2):

- (45) a. Give the bottle to the baby (full/*awake).
 b. Give the baby the bottle (full/*awake).
 c. Rub the cloth on the baby (torn/*asleep).
 d. Rub the baby with the cloth (torn/*asleep).
 e. Dry the baby with the cloth (asleep/*torn).

The order of nouns in noun–verb compounds must similarly depend only on initial syntactic position. Noun-to-verb incorporation is an alternative to argument projection by XP-movement (Baker 1988).¹⁹ Nouns therefore incorporate from positions from which they have not moved, following the order of initial thematic composition (Pesetsky 1995). Consider N-N-V gerund compounds of causatives. For Locational causatives Theme becomes object and the compound order is Λ - Θ -V (46a, c), not Θ - Λ -V (46b, d). This is so whether corresponding to non-causatives with semantically (46a, b) or structurally (46c, d) projected (Case-marked) Location. Compound order here thus correlates with both projected and initial position. In respect of the latter, Location, appearing farther from the verb, is incorporated after the Theme, implying initial specifier and complement positions respectively:

- (46) a. [garden [radish growing]] growing radishes in the garden
 b. *[radish [garden growing]] (<radishes grew in the garden)
 c. [salad [radish including]] including radishes in the salad
 d. *[radish [salad including]] (<the salad included radishes)

For Motional causatives, if Goal or Source is projected semantically (47a, b), the compound order has the Locational role first, as for Locational causatives, i.e., Γ - Θ -V or Σ - Θ -V. This again reflects Locational role and Theme in initial specifier–complement relation. However, if Goal is projected structurally as object (47c), either order is possible in the compound Γ - Θ -V or Θ - Γ -V, while if Source is projected as object (47d, e), we have only the order Σ - Θ -V. Strikingly, even for a verb that has only Source object and oblique Theme (47e), it is Theme that first incorporates in the compound. The implication is that in initial syntactic structure a Motional predicate has two colinked Themes, one in construction with Goal and one with Source. Goal is relative specifier to one and complement to the other, hence either order appears, while Source is relative specifier to both, hence always farthest from the verb:²⁰

- (47) a. [fountain [penny throwing]] (throwing pennies into fountains)
 *[penny [fountain throwing]] (*throwing fountains with pennies)
 b. [airplane [missile dropping]] (dropping missiles from airplanes)
 *[missile [airplane dropping]] (*dropping airplanes of missiles)

- | | | |
|----|--------------------------|---------------------------------|
| c. | [fence [stick hitting]] | (hitting sticks against fences) |
| | [stick [fence hitting]] | (hitting fences with sticks) |
| d. | [tub [water leaking]] | (leaking some water from tubs) |
| | *[water [tub leaking]] | (leaking tubs of some water) |
| e. | [visitor [car robbing]] | (*robbing cars from visitors) |
| | *[car [visitor robbing]] | (robbing visitors of cars) |

The variation in (47) implies a specifier–complement relation between Source and Goal as well. Thus Source appears before Goal in a compound, regardless of how projected. With oblique Source and Goal the pattern is only $\Sigma\text{-}\Gamma\text{-}\Theta\text{-}V$ (48a–c). With Goal object (48d–f) we also obtain $\Sigma\text{-}\Theta\text{-}\Gamma\text{-}V$. But even if Source is object (48g–i) it cannot be nearer the verb than Goal:

- | | | | |
|------|----|------------------------------|--------------------------------|
| (48) | a. | roof ground ladder lowering | (lowering the ladder from |
| | b. | *roof ladder ground lowering | the roof to the ground) |
| | c. | *ground roof ladder lowering | |
| | d. | bottle wall paint squirting | (squirting the wall with paint |
| | e. | bottle paint wall squirting | from a bottle) |
| | f. | *wall bottle paint squirting | |
| | g. | tub floor water leaking | (leaking tubs of water onto |
| | h. | *floor water tub leaking | the floor) |
| | i. | *water floor tub leaking | |

The variable behavior of Goal in Spatial Motional causatives (47c) contrasts with its behavior in Possessional Motional causatives, with dative shift or double object construction alternants. Here it again behaves like Source (cf. 49) always incorporating after Theme. It is therefore configurationally distinct, always in relative specifier to the Theme that projects (Gruber 1996):

- | | | | |
|------|----|---------------------------------|-----------------------------|
| (49) | a. | [student [book lending]] | (lending books to students) |
| | | *[book [student lending]] | (lending students books) |
| | b. | traveler accommodation denying | (*denying accommodation to |
| | | | a traveler) |
| | | *accommodation traveler denying | (denying a traveler |
| | | | accommodation) |

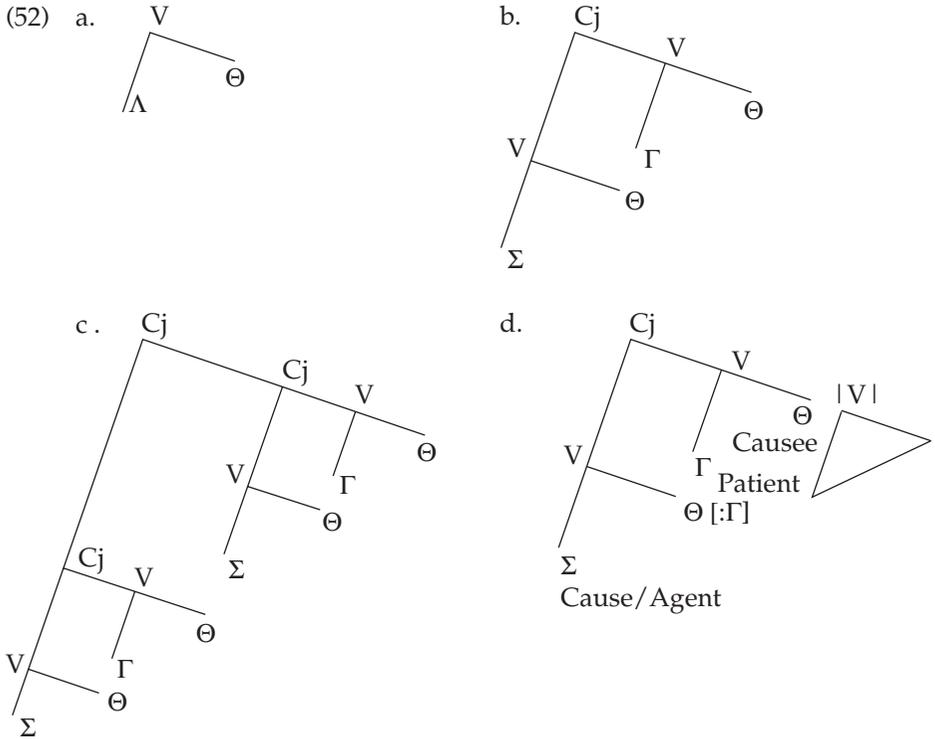
Motional causatives with Goal or Source object (47c, d) also contrast with resultative causatives where these roles are colinked with a consequent Theme object (50a, b). This Theme incorporates first yielding $\Theta\text{-}\Theta\text{-}V$, hence initially relative complement to the precedent Theme:

- | | | | |
|------|----|-------------------------------|--------------------------------------|
| (50) | a. | *[tub [water filling]] | (*filling water into the tub) |
| | | [water [tub filling]] | (filling the tub with water) |
| | b. | *[balloon [helium deflating]] | (*deflating helium from the balloon) |
| | | [helium [balloon deflating]] | (deflating the balloon of (*some |
| | | | helium) |

Finally, in a causative/agentive, since Cause/Agent is a Source, it is initially in a specifier relative to the Causee subpredicate (Theme) and the role that projects to object out of it. Hence the compound order would be Agent-(oblique)-object-V:

- (51) a. [hunter [deer shooting]] (shooting deer by hunters)
 *[deer [hunter shooting]]
 b. nurse oxygen respirator filling (filling respirators with oxygen
 *respirator nurse oxygen filling by nurses)

The specifier-complement relations implied in the above patterns support distinct positions for particular theta-roles at an initial syntactic level. Location, or Locational role, is the specifier of a thematic phrase V, while Theme is its complement (52a). Source and Goal are Locational roles in Locational subpredicates: these are combined as specifier and complement, respectively, of an asymmetric sequential conjunction Cj (52b), forming a Motional predicate. Iteration of this combinatorial process between precedent and consequent Motional subpredicates produces a resultative (52c). A causative/agentive verb (52d) consists of a matrix Motional predicate whose Source is Cause/Agent (projected as subject), whose Goal is Patient (colinked with object), and whose Theme is the Causee predicate |V| (out of which an element raises to object):

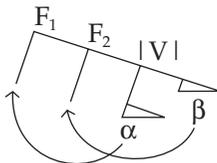


3.3 Syntactic projection and the epiphenomenality of hierarchies

If theta-roles are discretely determined in absolute initial syntactic configurations, the latter constitutes thematic signification itself. In fact it shows an iconicity of generalized relative precedence. Argument projection would then be entirely by syntactic computation. In fact it shows characteristics of movement. Theta-roles not always expressed by the same arguments mean dislocated positions for the latter. In particular, subject–object asymmetries distinguish movement from initial specifier and complement positions. The primary case of Agent and Patient/Theme is repeated between Location and Theme, Source and Theme, Theme and Goal, and precedent and consequent Theme. The same distinction is shown in N-N-V compound order.

To illustrate, the Agent α and the role β colinked with Patient, e.g. Theme of the Causee subpredicate (53), are initially in relative specifier–complement positions (54). This accords with the Internal Subject (Kuroda 1988) and Unaccusative Hypothesis (Perlmutter 1978). Optimal movements to functional positions result in Agent projected as subject at F_1 , and Patient/Theme as object at F_2 . A similar account can be given for projection asymmetries involving the other pairs of roles. (52) provides the required relative specifier–complement positions for them:

(53) **Theta-role subject–object asymmetries**



α	β
Agent	Patient/Theme
Location	Theme
Source	Theme
Theme	Goal
Precedent Theme	Consequent Theme

- (54) α is *relative specifier/complement* to β , iff in the minimal maximal projection XP containing both α and β , the specifier/complement of XP is or contains α but not β .

Obligatory colinking also shows movement behavior. In a causative/agentive, the role colinked with Patient is whatever raises to object from the Causee. This follows if colinking entails movement into functional positions locally above each combined subpredicate. Moreover, the higher the combinatorial level, the further these positions from basic ones, hence the more diverse the theta-roles reaching them. At the lowest level, combining Locational subpredicates into a Motional, the colinked roles are both Theme. Higher, combining Motionals into a resultative, the precedent role is free.

As seen, theta-role hierarchies are inadequate merely as a sequence of names. Also theta-roles are defined in a complex structure, with many tokens of the same type. Therefore a relative basis to hierarchic principles is preferable,

such as the relative embedding of conceptual arguments in event structure (Jackendoff 1990b). Indeed, relative specifier–complement positions form a kind of relative embeddedness, and projection asymmetries constitute hierarchical correspondences under a generalized notion of precedence. Therefore syntactic argument projection by movement from these positions renders hierarchies epiphenomenal.

Syntactic projection also accounts for what hierarchies cannot. The Source–Goal subject–object asymmetry in resultatives (20), the oblique Theme (23), and aspectual colinking asymmetry (24) all involve precedent colinked roles. However, hierarchies can refer only to the single role of each grammatical argument by which it is projected, namely its most consequent (or “dominant”) role.

In a relative hierarchy the least embedded role in event structure is preferentially projected. But this works differently for subject and object. It also depends on whether a precedent subevent in a resultative is represented as a conceptual argument, e.g. a *by*-phrase, or as the specifier of a sequential conjunction. If the former (as in Jackendoff 1990b) the precedent Theme is more embedded and is projected as object, while the consequent Theme is projected as subject, as in (55a). The opposite, however, occurs (55b). Saying that the precedent Theme is Actor and therefore subject, since Actor is least embedded, begs the question: why *must* the precedent Theme be Actor?

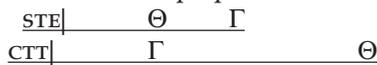
- (55) a. *The cup knocked the stone apart.



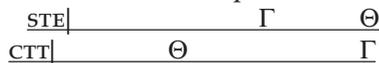
- b. The stone knocked the cup apart.



- (56) a. ... knock the cup apart with the stone



- b. *... knock the stone apart with the cup



In contrast, this conception of representation and hierarchy works for object projection in resultative causatives. Here the least embedded Theme becomes object and the more embedded Theme is oblique (56a), but not the opposite (56b). Stipulating that the consequent Theme is Patient, and therefore object, or that the precedent Theme is an adjunct to which Patient colinking cannot apply, again begs the question: why should the consequent Theme be Patient and the precedent Theme adjunct? Finally, on the hypothesis that the precedent event is specifier of sequential conjunction, its Theme is least embedded, and the opposite predictions pertain; we correctly predict the paradigm for the resultative subject (55), but incorrectly for the causative object (56).

The problem is linking via a single hierarchy for subject and object. The asymmetry is indicative of movement. The subject is projected from the less embedded position and the object from the more embedded. On the hypothesis that the representation of resultatives is by sequential conjunction rather than conceptual arguments or adjuncts, the precedent event is less embedded as specifier. Its Theme is therefore projected as subject, not as object (55a, b). The consequent event is more embedded as complement, and its Theme is projected as object, not as subject (56a, b).

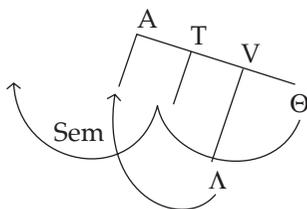
4 Derivations by Syntactic Projection

We outline here feasible means of syntactic computation to derive projection asymmetries (Gruber 1994, 1996, 1997, Gruber and Collins 1997). Configurational determination of Case in positions dislocated from thematic positions is essential.

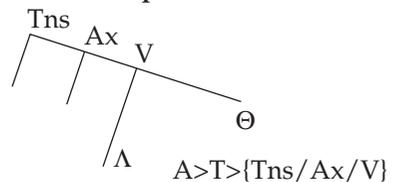
4.1 Locational predicates

The two structural Case positions in (53) explain the Location–Theme asymmetry for transitive predicates (10a). For intransitives (10b), however, ad-hoc stipulation of semantic Case in thematic position for Location but not Theme would be required. A solution is to generalize semantic Case to structural Case, assigning it in a distinct dislocated position accessible only to a specific role, hence theta-related. For Location this is a specifier position A (57a), representing the grammatical-argument/Case-licensing property (cf. Agr) of the thematic head. If Location and Theme are initial specifier and complement respectively, A is above a specifier position T,²¹ representing a property (topicality, dislocation) of the thematic head, to which Theme must first move:²²

(57) a.



b. Locational predicate

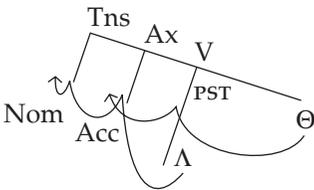


Properties A and T produce functional extensions of each of three distinct substantives (57b), hence three potential Case/argument positions in Locational predicates. The highest, Tense (Tns), assigns nominative, projecting subject. The lowest, the thematic head (V), assigns semantic Case. An intermediate auxiliary (Ax), perhaps aspectual, assigns accusative, projecting object.²³ V,

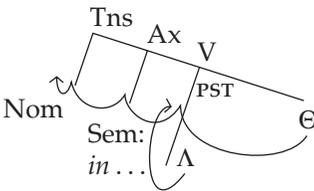
unlike Tns and Ax, is “thematic,” with a lexical initial specifier (long branch), the Location Λ .

Syntactic derivations demonstrating the Location–Theme subject–object asymmetry (10) are shown in (58). Elements in theta-role positions are attracted by functional positions T or A to achieve Case/argumenthood. They move, keeping to minimal links, in a “leap-frogging” fashion (Chomsky 1993, 1995b). The transitive form (58a) is distinguished from the intransitive (58b) by whether Location is projected “structurally,” optimally to the highest A position, or “semantically” to the lowest. The A position is facultatively present to Case license a nominal that cannot be attracted higher. Thus Theme cannot be projected as accusative in the extension of Ax in (58b):

- (58) a. The box contains the ball.

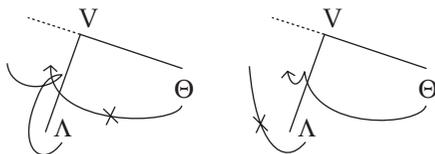


- b. The ball lies in the box.

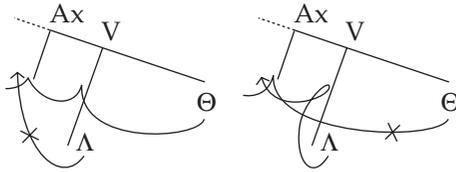


Movements to derive intransitive (59a) and transitive (59b) predicates ruled out by the Location–Theme asymmetry violate the minimal link condition. Theme cannot achieve Case in the semantic position (59a) since to do so either it must cross two specifier positions or the Location must. Similarly for Location to achieve accusative Case (59b) either it or Theme must cross two positions:

- (59) a. $^*\Lambda$ ——— | $^{\circ}\Theta$



b. $*\Theta$ ——— | ——— Λ

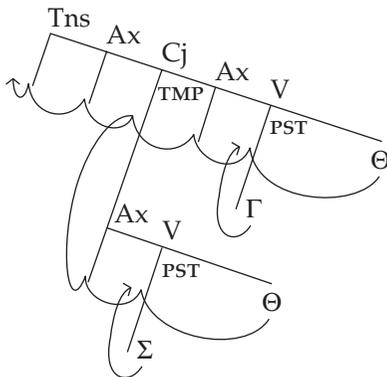


4.2 Motional predicates

We assume substantive and functional categories uniformly extend thematic ones (Cj, V) in a Motional predicate (52b), except for Tns extending the predicate as a whole. The intransitive form with semantically projected Source and Goal is derived in (60). Suppose, consistent with the discussion in section 3.3, elements that move into T extensions of thematic categories under Cj are colinked. Only Theme moves into T extending V, so only Themes may be colinked in a Motional predicate. The two tokens form a single argument (Chain), here moving across the board uniformly through Ax to subject:

(60) The ball rolled from the bush to the tree.

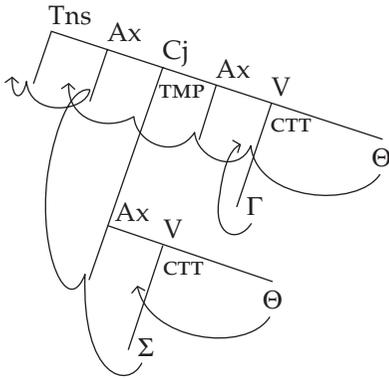
Θ ——— PST | ——— Σ ——— Γ



(61) demonstrates the Source–Goal subject–object asymmetry for transitives (13b, c). Either Source or Goal is projected structurally. Only one colinked Theme token can, or needs to, move to a Case position. If Source moves to subject, Theme moves from the complement of Cj to object (61a). If Goal moves to object, Theme moves from the specifier of Cj to subject (61b). The opposite possibilities are impossible. The movement of Source in (61a) into the A extension of matrix Ax as object violates the minimal link condition. Two specifier positions are crossed: the T extensions of matrix Ax and Cj occupied by Theme moving to subject. Similarly Theme in (61b) cannot move to object while Goal moves to subject without violating minimality:

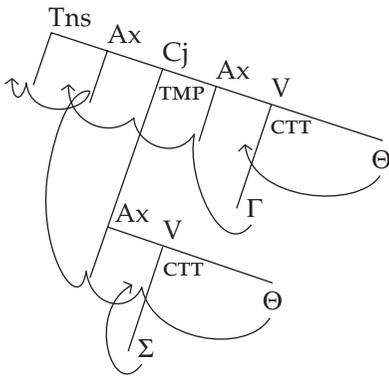
- (61) a. The tree dropped fruit to the ground.

Σ CTT | Θ Γ



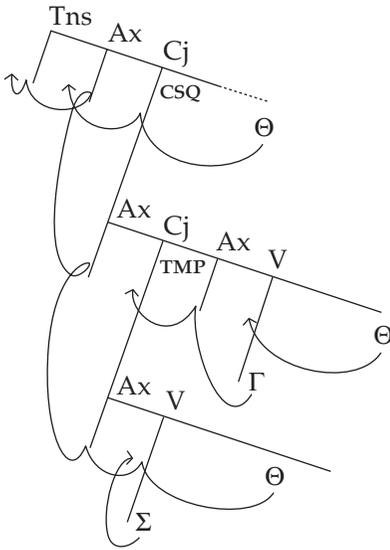
- b. Fruit hit the ground from the tree.

Θ CTT | Γ Σ

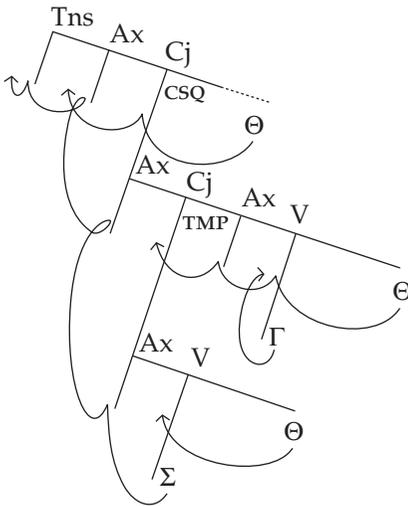
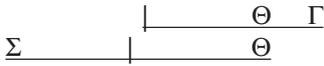


4.3 Resultative predicates

The resultative structure (52c) is uniformly extended as in (62), deriving an intransitive with Sources and Goals projected semantically. Themes are colinked at each combinatory level and projected across the board to subject. Colinking under Cj-CSQ is in the T extensions of Cj-TMP:



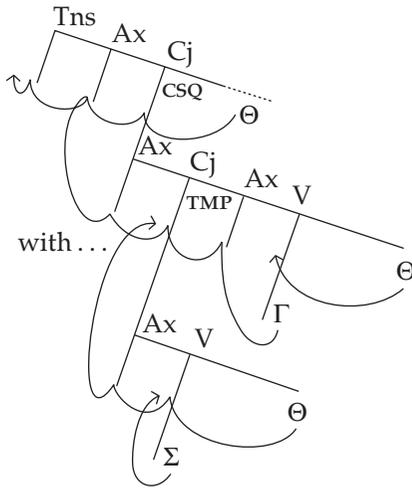
b. The tank leaked the fluid free.



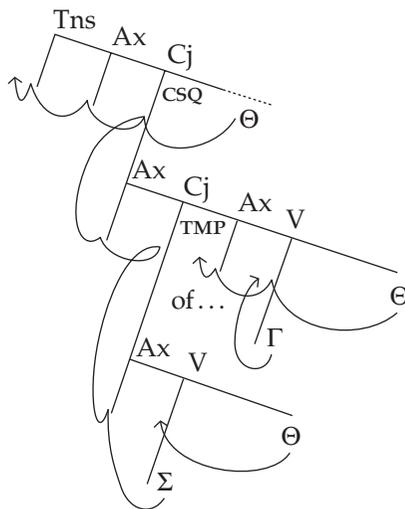
The remaining two possible resultative forms exhibit the Source–Goal oblique Theme asymmetry (23). As shown in (64), Goal and Source are again projected structurally. Unlike (63), however, they move both into the position of colinking with the consequent Theme and through Ax to subject. This strands the precedent Themes in lower positions specific for oblique projection as a

with or of phrase respectively, deriving the asymmetry.²⁴ The aspectual colinking asymmetry (24) also follows if Ax has an aspectual property satisfied by movement of the colinked element into it:

- (64) a. The tank filled with petrol out of the pump.

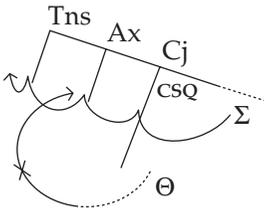
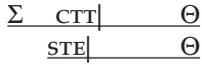


- b. The cup emptied of water onto the ground.

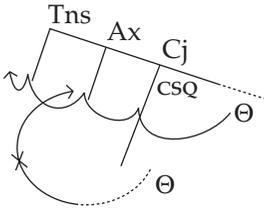


The precedent role subject condition (27a) requiring the subject to project a theta-role of the most precedent subpredicate is demonstrated by the impossibility of (65a) (= 28b). An element out of a consequent subpredicate, here Source, cannot be projected to subject above an element out of a precedent subpredicate, here Theme, without violating the minimal link condition. The consequent role object condition (27b), that an object must project a theta-role of the most consequent subpredicate, is violated in the same way (65b) (= 29a):

- (65) a. *The tree broke off some branches.



- b. *The cup filled water.



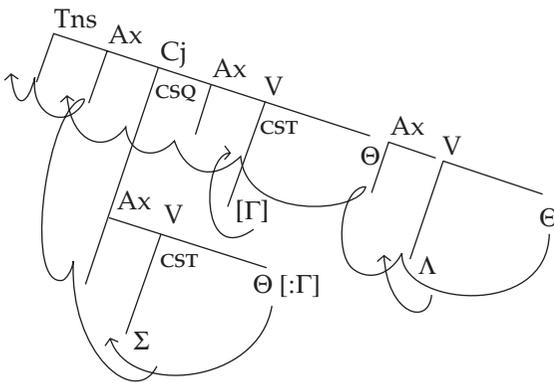
The consequent role complement condition (27c) that a complement projects with respect to its most consequent theta-role is shown by (66) (= 30), impossible with the indicated meaning. Given Goal;Theme colinking, projection with respect to Goal means Case in the semantic position (Sem). But once Case-marked nothing drives it to the higher colinking position T-Cj-TMP:

move to subject position, it can be any role. So also the element that moves to object (colinked with Patient) can be any role, since it does not compete in movement with the element colinked with Agent.

In lexical causatives of Locationals the meager structure $|V|=V$ means the oblique position in which erstwhile subject or object is projected is that of semantic Case. Even if Location is specified for structural projection, it is blocked by movement of the Theme and forced for Case in the extension of V , a semantic Case position. The difference between transitive and intransitive is thereby neutralized. Transitive *include* (68b) has the same oblique-Location causative form as intransitive *lay* (68a), hence part (a) of the Locational-Motional lexical causative asymmetry (35):

- (68) a. John lay the ball in the box.

$$\frac{\quad | \quad \Theta \quad \Lambda}{\Sigma \text{ CST} | \Theta \quad [:\Gamma]}$$
 (John caused [the ball lay in the box].)



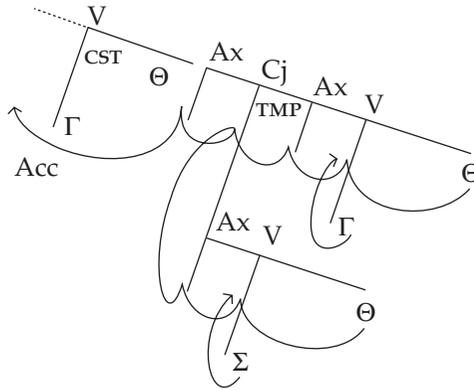
- b. John included her name in the list.

$$\frac{\quad | \quad \Theta \quad \Lambda}{\Sigma \text{ CST} | \Theta \quad [:\Gamma]}$$
 (John caused [the list include her name].)

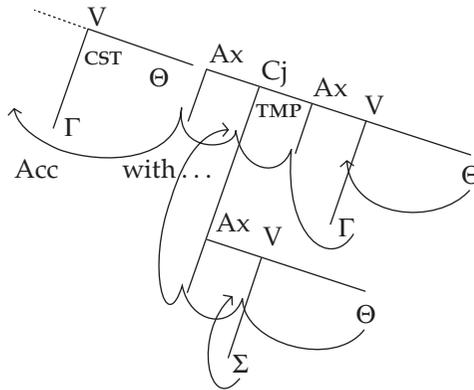
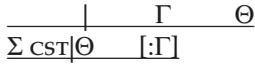
In causatives of Motional intransitives the Theme becomes object (69a). For transitives Theme is projected obliquely, whether erstwhile subject with Goal object (69b), or object with Source subject (69c), again a kind of neutralization. (69) thus shows part (b) of the Locational-Motional lexical causative asymmetry (35) and the oblique Theme asymmetry in lexical causatives (36):

- (69) a. John rolled the ball from the tree to the bush.

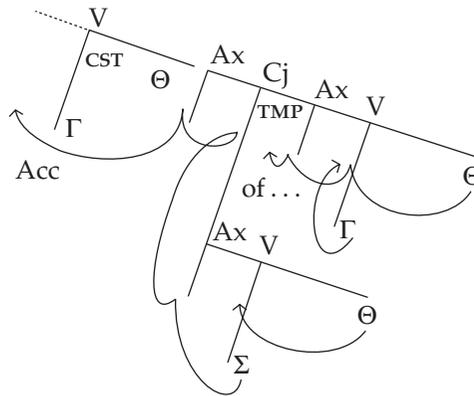
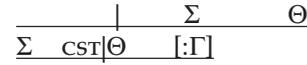
$$\frac{\quad | \quad \Theta \quad \Sigma \quad \Gamma}{\Sigma \text{ CST} | \Theta \quad \Theta [:\Gamma]}$$



b. John hit the wall with the stone.



c. John tapped the bottle of some water.

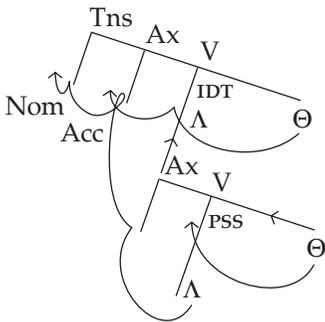


4.5 Possessional predicates

Both the Possessional–Spatial asymmetry (17) and Possessional double object constructions (38b) result from a deficiency of Possessional predicates: they lack the conceptual dimension of a head distinct from the Theme. Identificational predicates are also deficient, lacking a head distinct from the Location (Gruber 1996).²⁵ A complete Possessional predicate is formed by a matrix Identificational subpredicate containing a Possessional one as Location (70a). Thus “John owns the book” or “the book belongs to John” has a basic structure similar to “the book is John’s (book).” Identification of Theme or Location with predicate heads (straight arrows) must occur because of the phrasal deficiencies: either one or the other must project as a predicate phrase.²⁶ Possessional Theme is colinked with Identificational Theme which moves for Case. The derivation of a transitive Locational Possessional predicate is thus analogous to that of a Spatial one (58a), without asymmetry. If a Motional Possessional subpredicate is, like a Locational one, completed by a matrix Identificational subpredicate, the derivation of a predicate with structural Goal (70b) projects Goal as subject, like Source. Thus the Possessional configuration results in the Possessional–Spatial asymmetry. The order Θ - Γ (pss)-V in compounds (49) is also explained:

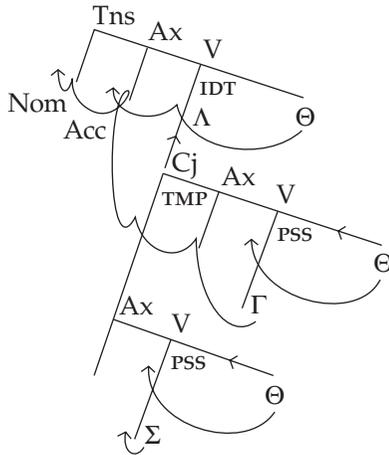
(70) a. John owns the book.

Λ pss | Θ



b. John got the book from Bill.

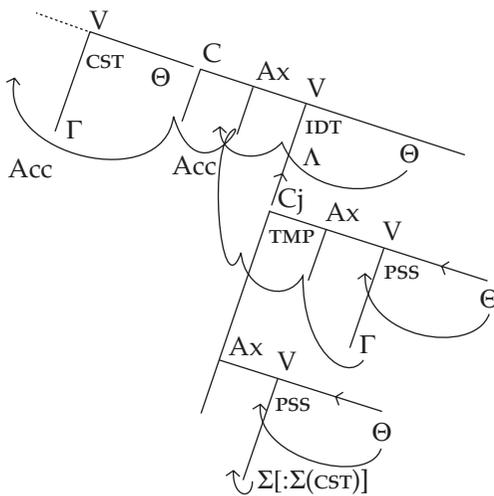
Γ PSS | Θ Σ



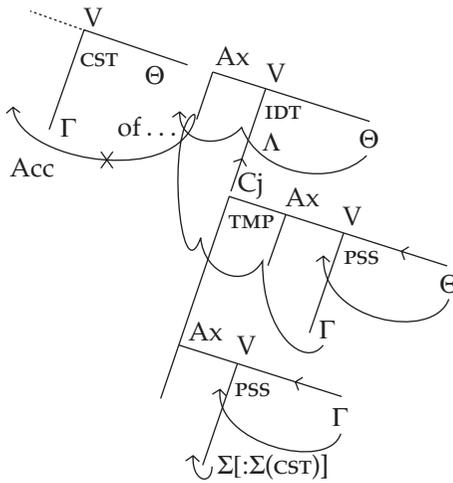
Aside from Possessionals, double object constructions occur in morphological as opposed to lexical causatives (69) in many languages. This suggests the Causee subpredicate in the former is headed by C. Assuming a lexicalization cycle stops at C (Chomsky 1998a) and is associated with agreement (cf. Poletto 1991), Case achieved locally below C would be direct Case. The Possessional double object construction would then be explained if it had the configuration of a morphological causative (71a):

(71) a. John gave Bill the book.

Σ PSS | Γ Θ
 Σ CST | Θ [Γ]



b. *John gave Bill of the book.



Case in Ax immediately below C would be Accusative. Given the Possessional configuration, a structural Goal is projected above Theme: it is in fact the raised Goal subject of an erstwhile Possessional transitive. The same configuration makes the projection of a Possessional lexical causative without C impossible (71b). Projection in Ax heading the Causee blocks the movement of Theme. Thus Possessional causatives adopt the form of a morphological causative double object construction, in order to have the causative of a structural Goal predicate at all.

NOTES

* This work was supported in part by the Social Sciences and Humanities Research Council of Canada grant no. 411-92-0012 ("La Modularité de la Grammaire: Arguments, Projections, et Variations") and Fonds Institutionnels de Recherche (University of Quebec at Montreal) to Anna-Maria Di Sciullo.

1 That Agent or Cause is a Source can be seen from the meaning of *for* as in the following:

(i) John sold the car for \$100.

(ii) John bought the car for \$100.

(iii) John destroyed the house for \$100.

The object of *for* is a Theme whose Goal and Source are identified with the complementary role of the main Theme. "John" is Source of "the car" and Goal of the "\$100" in (i), but Goal of "the car" and Source of the "\$100" in (ii). In (iii) "John" is Goal of the "\$100" because he is Agent, i.e. Source of the "destroying."

- 2 A “true” object is one licensed in a functional projection (AgrOP) specifically blocked in the passive and distinct from that in which semantic Case is licensed.
- 3 This “thematic functional notation,” stemming from work with Ogwueleka (1987), is primarily a descriptive form of conceptual analysis. The term “function” applies to these forms, while, somewhat loosely and interchangeably, the term “event(uality)” will refer to their denotation as part of event structure, and “predicate” to the forms in grammatical syntax that express them.
- 4 Oblique Case often marked by a preposition contrasts with direct Case, e.g. subject or object, sometimes marked by agreement. Thematically specific semantic Case contrasts with structural Case.
- 5 The possibility of an explicit Source related to the Goal shows that *hit* cannot be inchoative “come to be at/against” (predicate INCH STATE in Jackendoff 1990b), but must itself be Motional (GO).
- 6 More precisely, functional integrity is maintained for primary roles. More than one primary Source or Goal per Motional function, whose contents are in taxonomic opposition, produces a contradiction. But a secondary Source or Goal bearing a part-whole relation to the primary Source or Goal (i, ii) does not:
- (i) The tree dropped fruit from its upper branches.
- (ii) Fruit hit the house against its roof.
- Using thematic integrity as a theta-role diagnostic must distinguish primary and secondary roles.
- 7 The implicitness or explicitness of a theta-role follows independent conditions. Direct arguments must be explicit, unless a lexically specified object (e.g. *eat* FOOD). An implicit oblique Source in relation to a Goal, meaning “from elsewhere,” is possible (i), but not an implicit Goal in relation to a Source (ii):
- (i) The ball rolled to the tree.
- (ii) The ball rolled (*away) from the tree.
- In general, oblique arguments of certain (precedent) thematic (sub)functions, like Source, may be implicit.
- 8 Expletive *it* in the grammatical argument position is labeled, rather than its associate *that*-clause.
- 9 Path roles, describing Locus of movement (*over*), Direction (*up*), or Accompaniment (*along with*), optionally occur with Motional predicates and are distinguished from simple Source and Goal.
- 10 This is the normal form of a predicate expressing possession in Setswana:
- (i) monna (Λ) o-na le lokwalo (Θ)
man Agr-Cop with book
“the man has a book”
- 11 Their example is *enter*, which seems not to be a true transitive (i), while *reach* is (ii):
- (i) *The ocean was entered by the river.
- (ii) The ocean was reached by the river.
- 12 The subject theta-role need not be only a precedent Theme (Gruber and Collins 1997), but may be a precedent Source (cf. 21b). The generalization does not apply to

- obliquely projected roles of implicit matrix predicates, e.g. oblique Cause in (i), as well as subject Cause of an explicit causative verb (ii):
- (i) The food blew off the tray from the force of the wind.
- (ii) The force of the wind blew the food off the tray.
- 13 *Hit* is an apparent transitive in (i), but unpassivizable with this sense (ii), hence an implicit oblique:
- (i) The stone hit the pole into the road.
(? = The stone . . . went into the road.)
- (ii) The pole was hit by the stone into the road.
(* = The stone . . . went into the road.)
- 14 The test frame works with Goal but not with atelic Path roles. The object of *go around/surround* actually measures the event, suggesting that Path roles are structurally similar to Theme:
- (i) The fence goes fully around/surrounds the house.
(= the whole house/*the whole fence)
- 15 For Jackendoff, identified with Patient/Benefactee of the "Action" tier, arguably "precedent."
- 16 Assuming (consequent) Theme is of a different proto-role, this would explain why Instrument cannot be a direct object over Theme, effectively implying separate subject/object hierarchies.
- 17 For example, if Agent is above Theme in conceptual structure and Italian allows objects without subjects in syntax, then prohibiting downward correspondences would rule out Agent linking to object.
- 18 This view contrasts with that commonly assumed (e.g. Williams 1980, Hale and Keyser 1993).
- 19 N-incorporation does not alter projection asymmetries and occurs only for non-specific NPs. Case would still then be attained by movement, effected by an element (expletive/article) raising out of the NP.
- 20 Relative specifier/complement is formally defined in (54).
- 21 This order is explicit in Bantu auxiliary systems (Demuth and Gruber 1995).
- 22 Chomsky (1998a) attributes a dislocation property to functional categories, essentially the property of T reflected in the Extended Projection Principle to merge an element to topical prominence.
- 23 Ax is like Chomsky's (1998a) light verb *v* in that it attracts the direct object. However, the thematic property of *v* to have a specifier containing Cause is a property of the causative predicate (52a). The two functions are therefore distinct, although their positions form similar VP-shell configurations.
- 24 The *with* position, in the extension of C_j, is like the position for comitative *with* involving conjunction of Theme. The *of* position, in the extension of Ax and hence analogous to the position of a direct object, is like the position of oblique Case-marking of the object of a nominal (cf. Gruber 1997).
- 25 In "John has a book," the entity "book" maps directly into (entities possessed by) John; in "the animal is a dog," "the animal" maps into entities directly denoted by "dog." The (in)definiteness effect on the Possessional Theme and Identificational Location of these

deficient verbs reflects their identification with the predicate head.

- 26 Theme and Location would be distinguished derivationally by the order in which they are selected

from the lexicon and merged in syntax: α (Location/Ground) is selected, then β (Theme/Figure) is selected and merged with α . This conception has benefited by discussion with D. Jaspers.