A Minimalist Approach to Argument Structure

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In the past fifteen years of minimalist investigation, the theory of argument structure and argument structure alternations has undergone some of the most radical changes of any sub-module of the overall theoretical framework, leading to an outpouring of new analyses of argument structure phenomena in an unprecedented range of languages. Most promisingly, several leading researchers considering often unrelated issues have converged on very similar solutions, lending considerable weight to the overall architecture. Details of implementation certainly vary, but the general framework has achieved almost uniform acceptance.

In this paper, we will recap some of the many and varied arguments for the 'split-vP' syntactic architecture which has taken over most of the functions of theta theory in the old Government and Binding framework, and consider how it can account for the central facts of argument structure and argument structure-changing operations. We then review the framework-wide implications of the new approach, which are considerable.

1. Pre-Minimalism θ-Theory

In the Government and Binding framework, a predicate was considered to have several types of information specified in its lexical entry. Besides the basic sound/meaning mapping, connecting some dictionary-style notion of meaning with a phonological exponent, information about the syntactic category and syntactic behavior of the predicate (a subcategorization frame) was specified, as well as, most crucially, information about the number and type of arguments required by that predicate—the predicate's θ-grid. This basic picture of a GB lexical entry for a transitive verb is outlined in (1) below.

(1)   Pre-Minmialist θ-theory: A lexical entry, ready for projecting:

>PHON: kiss
>SYN: [_____$_v$ NP$_{ACC}$]$_{VP}$
>SEM: [<u>Agent</u>, Patient]   (or: [<u>1</u>, 2], or [<u>kisser</u>, kissee])
>+ some notion of what 'kiss' means

Principles—universal constraints on well-formedness—such as the Theta Criterion and the

Projection Principle filtered out deviant syntactic representations, ensuring that the predicate *kiss*

could not appear in a sentence with fewer arguments than required by the predicate's θ-grid, nor

with more than required.

In cases where the verb can grammatically surface with fewer or more arguments than

specified, the theory required a productive lexical operation to change the θ-grid. For example, a

passivization rule might alter the representation in (1) to the derived representation in (2a) below,

before the lexical entry projected any syntactic structure. Similarly, an agentive nominalization

rule could apply to (1) to produce the lexical entry in (2b):

(2)   a.   The result of a lexical passivization operation applied to (1):

>PHON: kissed
>SYN: [____]$_v$
>SEM: [Patient]   (or: [1], or [kissee])
>+ some notion of what 'kissed' means

         b.   The result of an agentive nominalization operation applied to (1):

>PHON: kisser
>SYN: [____]$_N$
>SEM: indexed θ-role of the V— either Agent$_i$ or Instrument$_i$
>+some notion of what 'kisser' means[1]

Other argument-structure affecting lexical operations might include 'causative' or 'applicative', or

'dative shift'—any case in which the lexical item appears in a sentential context in which its core

argument structure and subcategorization requirements appear not to be met. In GB, then, the

theory included a generative lexicon, in which certain lexical entries are derived from or related to other more basic lexical entries by redundancy rules. These rules, besides their syntactic effects, could also have morphological and semantic effects.

One central locus of theoretical activity involved discovering what kinds of principles govern the relationship between the theta structure of the verb and the syntactic structure which projected from it. Principles like Baker's UTAH (Baker 1988) or Tenny's Aspectual Mapping Hypothesis (Tenny 1992) or Levin & Rappoport's linking rules (Levin and Rappoport 1995) ensured that the appropriate participant in the event ended up in the appropriate place in the syntactic tree, accounting for theta-role/syntactic structure regularities. As noted above, the Theta Criterion ensured that no predicate could end up with the wrong number of arguments, and no argument could end up without an interpretation.

When the goals of the Minimalist Program were first articulated (Chomsky 1993 et seq.), however, it became immediately clear that the GB module devoted to argument structure failed to meet Minimalist goals on a number of criteria. The division of labor between two generative components—syntactic and lexical, each with their own primitive operations—ran counter to the central notion of employing the minimally conceptually necessary set of tools for constructing complex constituents. Empirically, the theta-theoretic architecture of the VP led to problematic conclusions when combined with the Bare Phrase Structure proposal of Chomsky (1995). Within the developing conception of the syntax/semantic interface in which Fregean function-application is the semantic correlate of the syntactic Merge operation, as described in Heim and Kratzer 1998, the Theta-Criteron was both redundant and imprecise, neither of which qualities are particularly Minimalist. Finally, the problematic tension between morphology and syntax which is especially evident in the realm of argument-structure alternations, crosslinguistically, is

highlighted even more in the context of Minimalist druthers. In many languages the lexical redundancy rules necessary to account for argument-structure alternations introduce a lot of morphology, which behaves fairly compositionally, i.e. syntactically, most of the time. Corresponding constructions in other languages can be purely syntactic, as highlighted especially, for example, by crosslinguistic variation in causative constructions, which are syntactic in English, but morphological in Japanese. Having two parallel systems within the language faculty deriving identical effects on Logical Form via completely different means in different languages is antithetical to the Minimalist Program's theoretical goals.

Fortunately, most of the solutions to these problems had already come into focus in the early 1990s, from converging analyses proposed to deal with several divergent problems. Hale and Keyser's theory of l-syntax, aimed at explaining causative/inchoative alternations and denominal verb structure, Kratzer's work on agent asymmetries in idioms, Travis and Borer's work on event structure and syntax, Larson's proposals concerning the structure of ditransitive verbs, and Halle and Marantz's work on the morphology/syntax interface all conspired to provide the general answer to most of these issues almost as soon as they arose, which is that verbal predicates are made up of at least two projections—the 'little v' hypothesis.

2. A minimal θ-theory: none

It is in fact trivially simple to establish that the basic functions of GB's theta-theoretic module are subsumed within a modern understanding of the interpretation of LF representations. In the semantic architecture of the Fregean program, as described in Heim and Kratzer 1998, predicates are functions, which must compose with arguments in order to achieve interpretability at LF. Unsaturated predicates, or extra arguments which cannot compose with predicates, will result in type mismatch and interpretation failure (see Heim & Kratzer 1998:49-53). Given that something

like Fregean semantic composition is needed to understand the behavior of quantifiers and

adverbial and adjectival modification in any case, it would be emphatically non-Minimalist to

propose a special interpretive mechanism and set of principles to capture the observation that

predicates require arguments and vice versa. Within Minimalism, and given a Fregean view of

the LF interface, the single Full Interpretation requirement can do the work of the Theta Criterion

and Projection Principle within Minimalist theory.

What, then, of the argument-structure operations (and their morphological correlates)

which formerly operated in the lexicon on θ-grids to create new lexical entries, with new

argument structures, ready for syntactic Merge? How can the relationship between inchoative

and causative forms of a verb, or between active and passive forms, be captured within a

Minimalist architecture? It would be possible to adopt the notion of optional application of

specific pre-syntactic functions which would operate in much the same way that the lexical

argument-structure operations did in the GB theory. However, given the converging evidence

that the internal structure of even monomorphemic verbal predicates is syntactically complex,

and that alterations to argument structure introduce additional syntactic complexity, Minimalist

theoreticians have come to the conclusion that such lexical generative mechanisms are

unnecessary, and hence undesireable. Argument structure alternations can be, and should be,

treated entirely within the syntactic component, via the same Merge and Move operations which

construct any syntactic constituent. One key idea that makes this proposal feasible is the notion

that the external argument is 'severed' from the verb proper, i.e. is the argument of a separate

predicate in the syntactic tree. In the next subsections, we review the converging proposals which

lead to this conclusion, and consider the implications for argument structure generally.

2.1 Structural limitations on argument structure: Hale and Keyser 1993, 2002

In the late 1980s and early 1990s, Ken Hale and Samuel Jay Keyser formulated their first attempt at an explanation of a pressing lexical-semantic question about θ-roles: Why are there only 6 or 7 robust θ-roles? Why not as many as 50 or 60? Even 10 or 12 would be more consistent with the number of case-markers or prepositions or classificatory verb stems in various languages. Dowty 1991 argued strongly for just two basic roles, a 'proto Patient' and a 'proto Agent' role; in his approach, other apparent roles consisted of semantic feature combinations intermediate between the two. Further, many of the well-motivated extant 6 or 7 seem to come in roughly animate/inanimate pairs: Agent/Causer, Patient/Theme, Experiencer/Goal, plus perhaps Incremental Theme. As noted by Baker 1997, theories with three Dowty-like 'macroroles' are adequate for most syntactic purposes. To the extent that finer-grained theta distinctions or elaborate Lexical Conceptual Structure are motivated (e.g. *CAUSE TO BECOME NOT ALIVE*='kill'), they seem to be motivated on semantic, not syntactic, grounds. Three to six θ-roles were adequate to account for the syntactic data bearing on θ-theory within GB.

H&K linked this theoretical question to an apparently unrelated morphological one: In many languages, the class of unergative verbs—intransitive verbs whose single argument receives an Agent θ-role—show clear signs of being bimorphemic, derived by combining an event-denoting noun and an agentive 'light' verb which can be glossed essentially as 'do'. Several examples of this phenomenon from Jemez and Basque are given by Hale & Keyser (1998: 115), repeated as (3) and (4) below. The difference between Basque and Jemez is simply that the nominal incorporates into the light verb in Jemez, while remaining independent in Basque.

(3)   *Jemez*
        a.   záae-'a   "sing"
                song-do
        b.   hįįl-'a   "laugh"

		laugh-do	
c.	se-'a		"speak"
	speech-do		
d.	tų-'a		"whistle"
	whistle-do		
e.	shil-'a		"cry"
	cry-do		
f.	sae-'a		"work"
	work-do		

(4)   *Basque*

a.	lo	egin	"sleep"
	sleep	do	
b.	barre	egin	"laugh"
	laugh	do	
c.	lan	egin	"work"
	work	do	
d.	negar	egin	"cry"
	cry	do	
e.	eztul	egin	"cough"
	cough	do	
f.	jolas	egin	"play"
	play	do	
g.	zurrunga egin	"snore"
	snore	do	

Even in English this relationship between unergative verbs and event nouns is quite transparent.

Most if not all English unergative verbs have a zero-derived nominal counterpart:

(5)   to laugh, a laugh; to walk, a walk; to run, a run; to work, work; to swim, a swim; to
        dance, a dance; to whistle, a whistle; to sneeze, a sneeze; to scream, a scream; to shiver, a
        shiver…

Hale and Keyser considered the comparative data in English, Jemez, Basque and other languages

to indicate the presence of a uniform underlying structure, according to which there was a special

verbal projection which introduced and assigned the Agent theta role, transliterated roughly as

'do'. They proposed that unergative verbs in English, as well as those in Jemez, are underlyingly

transitive structures in which an agentive light verb selects for and optionally incorporates its

bare N object. The Jemez and Basque light verb is morphologically visible while the English one

is not. However, the presence of such a null verbal morpheme in English unergatives would explain the correlation between unergative verbs and bare nouns, and a single structure would account for English, Jemez and other languages. They proposed the underlying structure below:

(6)   Unergative verb derivation
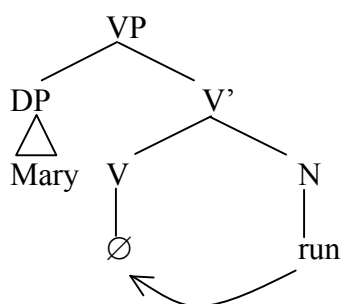
Unergative denominal verbs of birthing, such as *calve, pup, whelp, foal* and *spawn* would have the same structure as other unergatives, again accounting for the denominal character of such verbs.
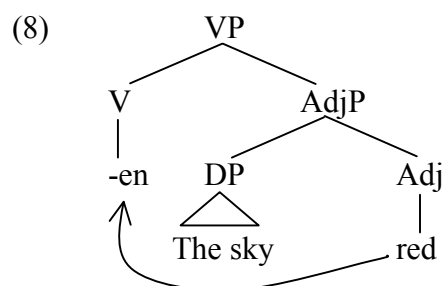
This proposal also provides an explanation for the lack of variation in the θ-roles assigned by unergative verbs to their single subject. If all unergative verbs are covertly composed of a null light verb 'do' and a nominal, then the real θ-role assigner—the element that truly selects the external argument—is the same in each case, the covert verb DO. There is only one θ-role assigned because there is only one θ-role assigner at work. The existence of several hundred different unergative verbs in English, for example, does not raise the spectre of several hundred different Agent-selectors; there's only one, which occurrs as a subconstituent of all of them. Hale and Keyser then went on to consider whether this idea could be fruitfully extended to other verbal predicates containing Agent arguments.

A similar situation arises with respect to causative/inchoative alternating verbs. In more languages than not, many inchoative verbs meaning something like 'become (more) ADJ' are morphologically related to or derived from the adjectival form. Some familiar English examples

are below, as are some examples from Hiaki (Yaqui), a Uto-Aztecan langauge of Sonora,

Mexico.

(7)   <u>Verb</u>   <u>Adj</u>   <u>Verb</u>   <u>Adj</u>

|			
to redden	red	sikisi	siki
to fatten	fat	awia	awi
to soften	soft	bwalkote	bwalko
to sharpen	sharp	bwawite	bwawi
warm	warm	sukawe	suka
….			

If inchoative verbs based on adjectives are derived by incorporating the underlying adjective into

a verbalizing head, their morphological relatedness is predicted, as well as the additional

morphology that shows up on the verbal form. Essentially, H&K proposed that deadjectival

inchoative verbs are incorporated versions of unaccusative resultative constructions; a somewhat

modified version of their structural proposal for an intransitive unaccusative verb is in (8)

below:[2]

(8)
```
              VP
         ____/  \____
        V           AdjP
        |         __/  \__
       -en      DP        Adj
        ↑       /\         |
        |____The sky_____ red
```

Here, the verbalizing element is semantically an inchoative raising verb; the construction is

equivalent to *The sky turned red(er)* or *The sky got/became red(er)*. No specifier of VP is

present, and no Agent θ-role is assigned.

These verbs, unlike unergative verbs, can alternate; that is, they may occur in a transitive

structure in which an Agent theta-role does appear, as in *The sun reddened the sky*. In such a

case, we could assume that, as in the case of the unergative verb, the verbalizer itself introduces

the Agent, in its specifier position. The structure of a causative alternant of an inchoative verb,

then, would be as in (9) below:

(9)
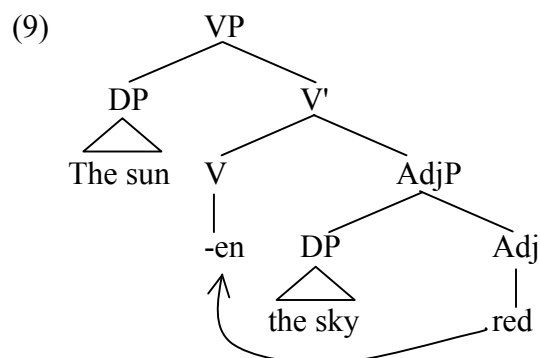
Hale and Keyser's proposal thus suggested the beginnings of a way to get rid of θ-roles

entirely. In (8) there is no specifier of VP, and there is no Agent in the structure — and it can be

freely added, as in (9), to create a causative version. In the structure for unergative verbs in (6),

on the other hand, there is necessarily already a specifier of VP, which receives an Agentive

interpretation; similarly in (9). Consequently no additional external argument can be added to

such verbs, explaining the ungrammaticality of *John laughed the baby and *John reddened the

sun the sky.

Hale and Keyser proposed that being an Agent simply means being in the specifier of VP,

no more, no less. In the same way that identifying tense and agreement morphemes with

functional syntactic heads renders the Mirror Principle unnecessary as a principle of the grammar

(it becomes a descriptive statement that is explained by the syntactic process of head-to-head

movement), identifying θ-roles biuniquely with syntactic positions renders linking principles

such as UTAH unnecessary. UTAH also becomes a descriptive statement, explained by the

semantic relationships between arguments, the positions they occupy in the syntax and the

functors that introduce them, rather than existing as a stipulated connection between an element

in a θ-grid and a location in the syntactic tree.

H&K also proposed a natural extension of this system to a third class of verbs which pose a similar type of morphological problem as unergatives. In the structures above, we have seen what happens when an N is the complement of V with specifier (paraphrase: 'X DO N'), as well as what happens when an adjectival predication is the complement of V, both without a specifier (paraphrase: 'BECOME [X Adj]'), and with a specifier ('Y CAUSE [X Adj]'). H&K also argue that there are cases in which a PP is the complement of the external-argument selecting V (paraphrase: 'X CAUSE Y on/at/with Z'). When Z is incorprated into V, these are the location/locatum denominal verbs catalogued by Clark and Clark (1979). Some of these locatum verbs are listed in (10a) below; H&K's proposed structure is given in (10b):

(10)   a.   bandage, bar, bell, blindfold, bread, butter, clothe, curtain, dress, fund, gas,
                 grease, harness, hook, house, ink, oil, paint, pepper, powder, saddle, salt, seed,
                 shoe, spice, water, word.

        b. Structure: The cowboy saddled the horse = fit the horse with a saddle
                                    The cowboy buttered the bread = smear the bread with butter
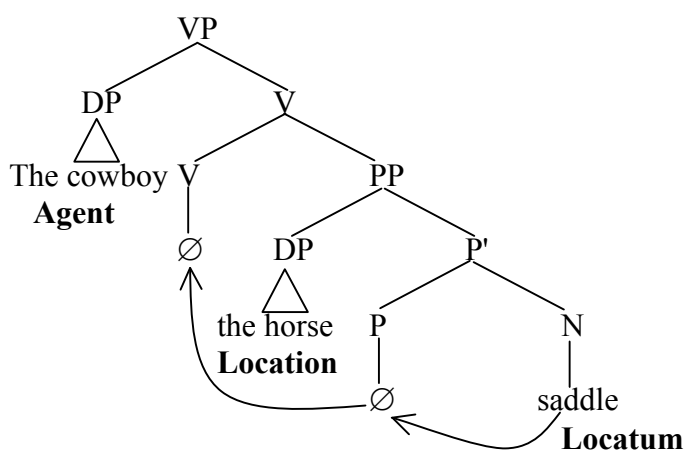
Again, the Agent argument occurs in the specifier of VP; the two inner arguments occur in the specifier and complement position, respectively, of the complement PP.[3]

H&K thus were able to claim that not only is spec-VP reserved for Agent arguments, but also that what it means to be an Agent is simply to occur in specifier of a particular VP. The θ-role depends on the location in the tree, not the other way around.
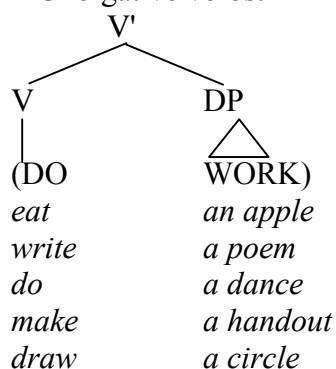
H&K were also able to propose a specific invariant location for Theme arguments. In all the structures containing *overt* direct objects above, namely (8) and (10b), the direct object undergoes a change of state or location, a canonical Theme quality. In both cases, the direct object is the 'inner subject'—the subject of an embedded predication (a Small Clause, in the view presented here). H&K proposed that the locus for the canonical Theme role is this Inner Subject position. The third robust θ-role—Goal/Location—is then associated with the position of "Inner Objects": complements to P embedded under VP, as in *put the book* *on the table*. The assumption of an invariant spec-VP position for Agents, plus the exploitation of all X'-theoretical complement structures (N=X°, Adj=X°+Spec and P=X°+Spec+Comp) for the sister-to-V position, allows at most three arguments to appear with any given verb. This, H&K proposed, is the essential answer to the intial question of why there are so few theta roles. It is because there are only three possible argument positions associated with any verbal predicate, namely 1. Spec-VP, 2. Spec of V's complement XP, and 3. Comp of V's complement XP, each of which recieves a certain interpretation by virtue of its structural relationship to that predicate.

H&K had thus arrived at an inventory of structures for verbal predicates which maximally exploited X-bar theoretic structural possibilities. A 'light' V predicate selects a complement, either an N (nonbranching), an Adj (binary branching) or a P (full X' structure with specifier and complement).[4] The V predicate itself may or may not have a specifier position, which is the locus of the Agent argument, when present.
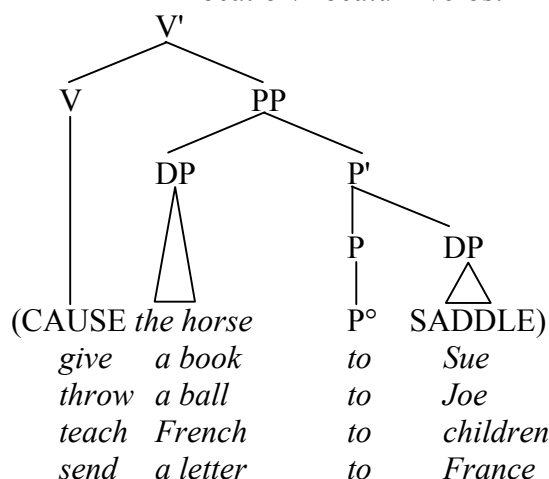
There are nonincorporated English counterparts of all of these structures, where the V

position is filled overtly with a true verbal predicate, rather than acquiring its lexical content via

incorporation of an adjective or noun. Each structure corresponds to a particular semantic class

of verbs, whose interpretation is derived from the particular syntactic frame in obvious ways:[5]

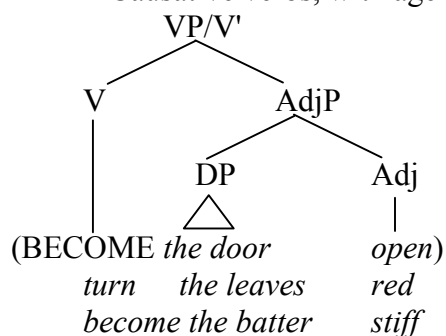(11)   Verb classes with unincorporated instances of H&K's structures:

a.   Verbs of creation/consumption[6]   c.   Verbs of transfer
        = Unergative verbs: = Location/Locatum verbs:
                V'   V'
              /   \   /   \
            V   DP   V   PP
            | /\   /   \
          (DO   WORK)   DP   P'
          eat   an apple   /\   / \
          write a poem   P   DP
          do   a dance   /\
          make   a handout   (CAUSE the horse   P° SADDLE)
          draw   a circle   give   a book   to   Sue
                                          throw a ball   to   Joe
                                          teach French   to   children
                                          send   a letter   to   France

b.   Verbs of change of state[7]
        = Unaccusative verbs, with inchoative V)
        = Causative verbs, with agentive V)
                VP/V'
              /   \
            V   AdjP
            | /   \
                  DP   Adj
                  /\ |
        (BECOME the door   open)
            turn   the leaves   red
            become the batter   stiff

In the rest of this paper, I will notate H&K's V category as *v*, and will usually notate complement

AdjPs and PPs with their Inner Subjects as SCs (small clauses). Nonbranching elements

downstairs will continue to be labelled N for the moment. We can summarize the proposed

structural correlations between θ-roles and syntactic position as follows:

(12)   θ-role   Position of DP
        Agent   ≈   Spec-vP
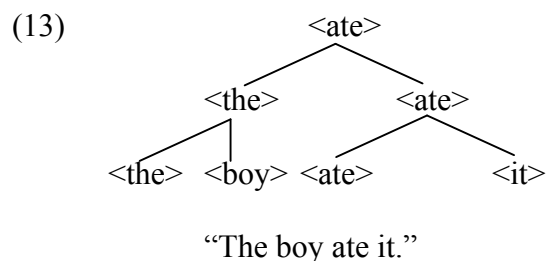   Theme   ≈   Spec-SC   ("Inner Subject")
        Goal   ≈   Comp-SC
        Incremental Theme   ≈   Comp-vP

There are two logically possible verb classes which the combinatoric system proposed above

makes possible, but whose existence was not addressed by H&K. We have thus far seen

adjectival complements with both inchoative *v* and agentive *v*, but no cases of nominal

complements or PP complements with inchoative *v*—that is, denominal predicates like *run* or

shelve with no external argument. I would like to propose, however, that these two verb classes

are instantiated, at least in a limited way, in English and other languages. The non-agentive

counterparts to unergative verbs like *calve* or *dance* are the weather verbs: *it rained, it snowed*.

These verbs simply represent incorporation of a bare N such as *rain* into the non-agentive v

BECOME; an expletive must then be inserted to satisfy the EPP in Spec-TP in English.

Similarly, unaccusative change-of-location verbs, as in *The plane landed* or *The boat docked*

(=BECAME *the plane* P° LAND) are the non-agentive counterparts to the agentive location

verbs.

One recurrent issue in this 'constructivist' view of thematic relations is the apparent lack

of productivity of agent-deleting alterntions (and, in the case of non-alternating unaccusatives

like *arrive*, agent-addition). All that is required is Merge of the embedded lexical structure with

the specifier-less *v* category (BECOME), rather than with the agentive *v* which selects for a

specifier (CAUSE), or vice versa. Why, then are sentences like *#The city destroyed* and *#The*

captain arrived the ship ill-formed? This question has been a fundamental issue in this

framework and its relatives since its inception. In response, some, like Borer (2005), have

proposed that in fact such mismatches are in fact grammatical, and their uninterpretability is of

the same order as that of a phrase like *#colorless green ideas*—not a problem for the syntactic

component at all. Others, like Harley and Noyer (2000) and Ramchand (2008), assume a system

of featural licensing that determines which frames a verb root can appear in. Assuming that the

problem of the productivity of alternation with specific verbs can be satisfactorily addressed,

however, Hale and Keyser's approach accounted straightforwardly for the morphosyntactic facts

crosslinguistically, and addressed their theoretical question concerning the number of θ-roles

available in natural language. As we will see next, it also provided a solution to two independent

problems which would otherwise have impeded the development of modern Minimalist theory.

2.2   *Bare Phrase Structure and the vP proposal*

The first problem concerned the development of a new framework for phrase-structure building.

Chomsky (1995), following a line first proposed by Speas (1986, 1990) and Fukui (1986),

proposed to eliminate the X-bar component of the grammar, reducing all structure-building to the

operation of Merge (see Fukui, this volume). The set of two items constructed by Merge is

labeled with a copy of the label of one of the items. The notions of *head* and *phrase* are then

configurationally determined: a node is a *head* if it does not dominate a copy of itself, and it is a

phrase if it is not dominated by a copy of itself (see Speas 1990:44). Intermediate projections—

bar-levels—have no status as objects of the theory. If an element meets both criteria, it can be

both a phrase and a head simultaneously, as the object pronoun in (13) is. Clitics are the

paradigm example of this: they behave like phrases in receiving a theta-role and checking Case,

and like heads in undergoing head-movement. A tree-notation of the sentence *The boy ate it* in

this approach might look like this:

(13)

```
                        <ate>
                   /             \
              <the>              <ate>
             /     \            /      \
        <the>  <boy>      <ate>        <it>
```

"The boy ate it."

(Here, the words enclosed in brackets are intended to represent bundles of syntacticosemantic and phonological features, including category. Below, I will use the category labels as a shorthand to facilitate exposition, but they should be understood to represent the entire bundle.)

In Bare Phrase Structure, therefore, non-branching nodes are a flat impossibility. Any X-bar theoretic analysis that requires a non-branching node requires reanalysis. For example, rather than propose a non-branching node, one could propose that a phonologically null element of the numeration has Merged undetected.

This new conception of phrase structure created a significant problem for the standard treatment of the unaccusative/unergative distinction. Recall that unergative verbs are intransitive verbs with a single external argument; unaccusative verbs, in contrast, are intransitive verbs with a single *internal* argument, which becomes the subject by raising from its VP-internal position. This distinction could be naturally represented in X'-theory by exploiting a non-branching bar-level. In GB theory, the external argument would be base-generated in Spec-VP, sister to V', while the internal argument would be base-generated in Comp-V, sister to V°, as illustrated in (14) below. The unaccusative/unergative distinction could thus be syntactically represented, as required by UTAH and allowing an account of the empirical distinctions between the two verb classes.

(14)   Before the advent of the vP hypothesis:

Unergative verbs in GB theory   Unaccusative verbs in GB theory

       The man   *laughed*   *arrived*   *the man*
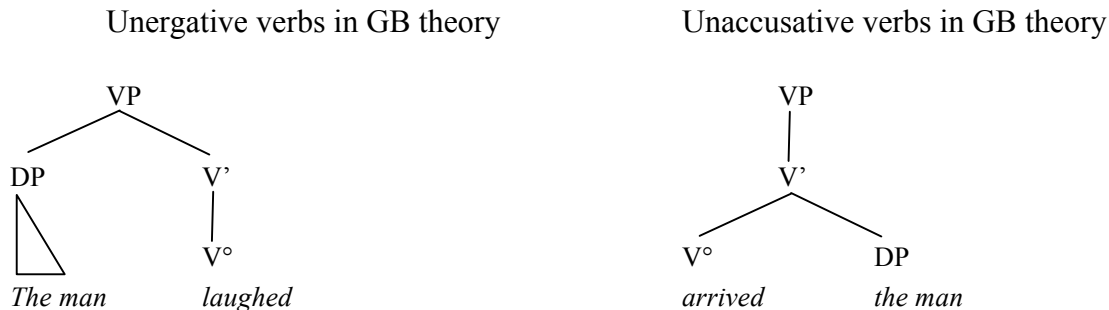
   This is clearly problematic in the Bare Phrase Structure approach, since the unergative/unaccusative structural distinction relies entirely on the presence of non-branching nodes. Within a BPS approach, the distinction presents a structural problem; eliminting non-branching nodes from (14) above produces (15) below:

(15)   Unergative   Unaccusative

a. VP$_{<dance>}$ b. VP$_{<dance>}$

DP   V$_{<dance>}$ V$_{<dance>}$ DP

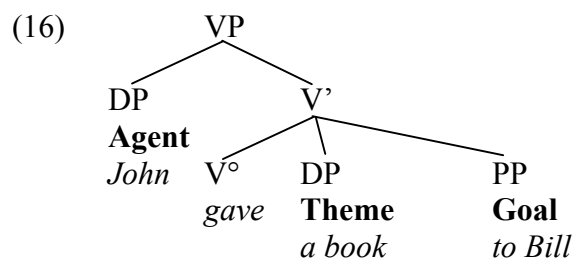John   dance   arrive   John
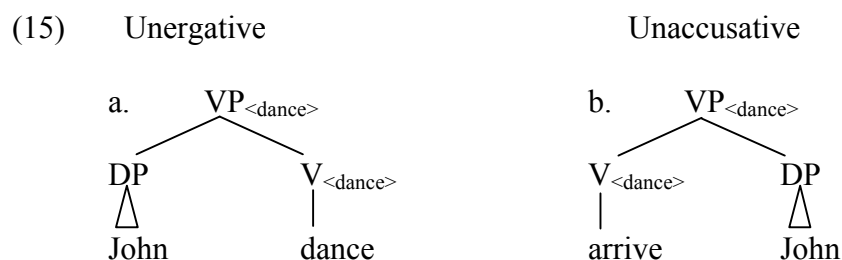
The unergative structure is supposed to contain a specifier (on the left) and the unaccusative one only a complement (on the right). But assuming that linear order does not matter in syntax, these two structures are indistinguishable, and the constellation of facts to do with the difference between the two classes of verbs has to be taken care of in some other, non-phrase-structural way (e.g. with reference to theta-roles or equivalents, as in LFG's f-structures).

   Chomsky (1995:247-248) recognized this problem, and pointed out that the Hale and Keyser vP system provided a solution.[8] Since Hale and Keyser proposed that unergatives actually are underlyingly transitive, with the structure in (6) above, while unaccusatives are truly intransitive with the structure in (8), their system permitted the preservation of the

unaccusative/unergative distinction without employing any non-branching nodes, thus allowing the elimination of X-bar theory.

2.3   *Making room in the argument structure: Larson 1988 and VP-shells*
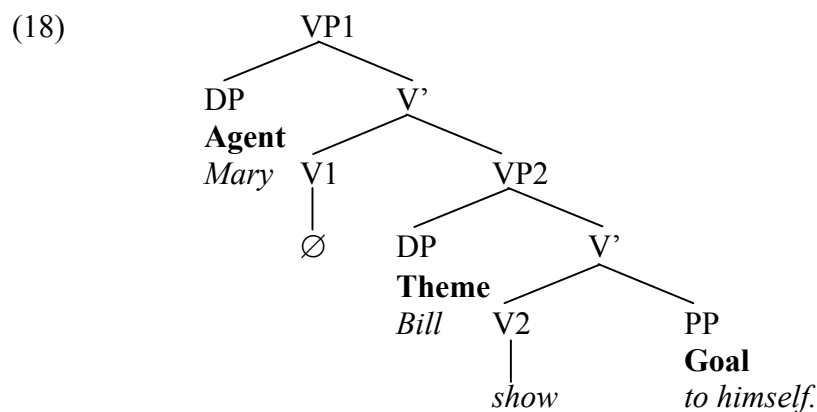
At the same time that Hale and Keyser were developing their framework, Larson (1988) arrived at a bipartite structure for the VP based on the argument-structure requirements of ditransitive verbs. Given the VP-internal subject hypothesis of Koopman and Sportiche (1986), according to which external arguments are base-generated in Spec-VP rather than Spec-IP, a ditransitive verb like *give* requires a ternary-branching V' constituent, to allow all arguments of the verb to receive a θ-role under government by the verb, as illustrated in (16) below:

(16)

```
                VP
          _____|_____
         DP           V'
        Agent     ____|_____
        John   V°    DP        PP
              gave  Theme     Goal
                    a book    to Bill
```

Following Kayne's (1984) suggestion that X'-theory should be constrained to binary branching structures only, (16) is a theoretically inconsistent structure. Further, in (16), and its dative-shifted counterpart for *John gave Bill a book*, the Theme and Goal elements c-command each other, but Barss and Lasnik (1986) showed that binding-theoretic considerations suggest that the two internal arguments are in an asymmetrical c-command relation, such that the first argument in either the *to*-dative or ditransitive structure can bind into the second, but not vice-versa, as illustrated in (17):

(17)   a.   Mary showed Bill himself (in the mirror).
        a'.   *Mary showed himself Bill.
        b.   Mary showed Bill to himself (in the mirror).
        b'.   *Mary showed himself to Bill.

Larson's solution was to propose the 'VP-shell' structure in (18) as the base-generated syntactic

structure for ditransitive verbs:

(18)

```
                    VP1
               ╱          ╲
         DP               V'
       Agent          ╱       ╲
       Mary   V1              VP2
               │          ╱        ╲
               ∅      DP              V'
                    Theme       ╱        ╲
                    Bill    V2             PP
                             │            Goal
                           show        to himself.
```

In this structure, the Theme c-commands and precedes the Goal, as required, and only binary-

branching nodes occur. The innovation is to generate the external argument in a separate VP, or

VP-shell, to which the lexical verb will head-move to derive the final word order with the verb

preceding the Theme. By now, the notion that the external argument appears in a separate VP

projection from the rest of the argument structure should be familiar. Larson's work established

that there were independent syntactic reasons to posit an extra VP for external arguments in the

case of ditransitives, and the proposal connected straightforwardly with the vP framework

developed by Hale and Keyser and adopted for theory-internal reasons by Chomsky. The

structure for ditransitives in (18) and the structure for location/locatum verbs proposed by Hale

and Keyser in (11c) are identical except for the node label on the lower shell.[9]

     Having seen that the postulation of an independent verbal projection as the position of

base-generation of Agent arguments can solve two thorny theory-internal problems, we now turn

to consider some semantic repercussions of the bipartite VP proposal

2.4   Semantic motivations for decomposing the VP:V-Obj Idioms

Several independent arguments have also been made for a split-vP that build on facts about

the semantics of eventive verbs. One primary class of such arguments derives from observations

from the generative semantics literature concerning the scopal interpretations of VP modifiers;

those are covered in section 2.5 below. A second argument builds on an independent observation

due originally to Marantz (1984) and analyzed by Kratzer (1994, 1996) as involving the

composition of verbal meanings through the conjunction of two separate predicates. Kratzer

points out that if external, agentive arguments are in fact arguments of a separate v° functional

projection, then Marantz's 1984 generalization about the restrictions on idiomatic composition

can be explained.

Marantz noted that while verb-object idioms/special interpretations are ubiquitous cross-

linguistically, verb-agent idioms (that exclude the object) are close to nonexistent.[10]

(19)   kill a bug   =   cause the bug to croak
             kill a conversation   =   cause the conversation to end
             kill an evening   =   while away the time span of the evening
             kill a bottle   =   empty the bottle
             kill an audience   =   entertain the audience to an extreme degree

Kratzer observes that if the subject and the object both compose directly with the verb *kill*, there

is no principled semantic reason why there shouldn't be as many subject-verb idioms as there are

verb-object ones. For example, *A bug killed the boy* could have one special interpretation (a non-

'kill' meaning), while *The food killed the boy* could have another. However, these kinds of

idioms, with free object positions and bound (idiomatic) agentive subjects, do not seem to occur.

If, however, Agents compose with a separate light verb and then have their interpretation

added to that of the lower predicate via a process Kratzer calls Event Identification, then the

semantic independence of Agent arguments is expected. Event Identification combines the

denotation of a Voice head (equivalent to v°, type $<e,<s,t>>$[11]) with the (argumentally saturated) denotation of the lower VP. This operation can be seen in (20) below (Kratzer 1996 ex. 19). In this example, it is asserted that there is an event (e) which is a wash-the-clothes event, and there is an event (e') and an entity (x) and x is the Agent of e'. Event identification tells us that these two events are the same event, so x is the Agent of the wash-the-clothes event. The x argument never composes directly with the V predicate, only with the Agent predicate.

(20)   (Voice)   (VP)   Voice'
            f   g   ➔   h
      $<e,<s,t>>$ $<s,t>$ $<e,<s,t>>$
   $\lambda x_e \lambda e_s Agent(x)(e)$ $\lambda e_s wash(the\ clothes)(e)$ $\lambda x_e \lambda e_s [Agent(x)(e) \& wash(the\ clothes)(e)]$

It is important to recognize that this treatment of Marantz's generalization only works if the object of the verb is truly an argument of the predicative V root, composing with it directly. A truly Neo-Davisonian analysis of the type proposed in much later work (e.g. Borer 1993, 2005), in which there is a separate functor which introduces the object argument as well, won't work, or rather, will make the wrong predictions about idiomatic interpretations of the √: it will predict that verb-object idioms should be as rare as verb-subject idioms.[12]

2.5   Scope of modification: Generative semantics redux

The vP hypothesis, particularly when enriched with an intuitive semantic content for the v° heads like Hale and Keyser's *DO*, Kratzer's function *Agent(x,e)*, etc., draws extensively on insights first formulated within the Generative Semantics framework (e.g. McCawley 1976). The vP hypothesis is formulated within a somewhat more restrictive theory of phrase structure and the syntax/semantics interface, but it is adequate to capture many of the insights that the Generative Semantics decompositional structures were designed to explain.

Consider, for example, a biclausal sentence like *John made Mary happy again*. The adverbial *again* can be interpreted in two ways, as modifying *happy* or as modifying *make*. This

ambiguity receives a straightforward structural analysis, since *again* can have two loci of

adjunction: one on the embedded (small clause) predicate *happy* and one on the matrix predicate

make, corresponding to the two interpretations. On the former, Mary was happy before

(independently of John), had become sad, and then she became happy again, thanks to John. On

the latter, Mary had been made happy by John in the past, had become sad, and then been made

happy by John again. The two structures are illustrated in (21) below:

(21)   a.   VP   b.   VP
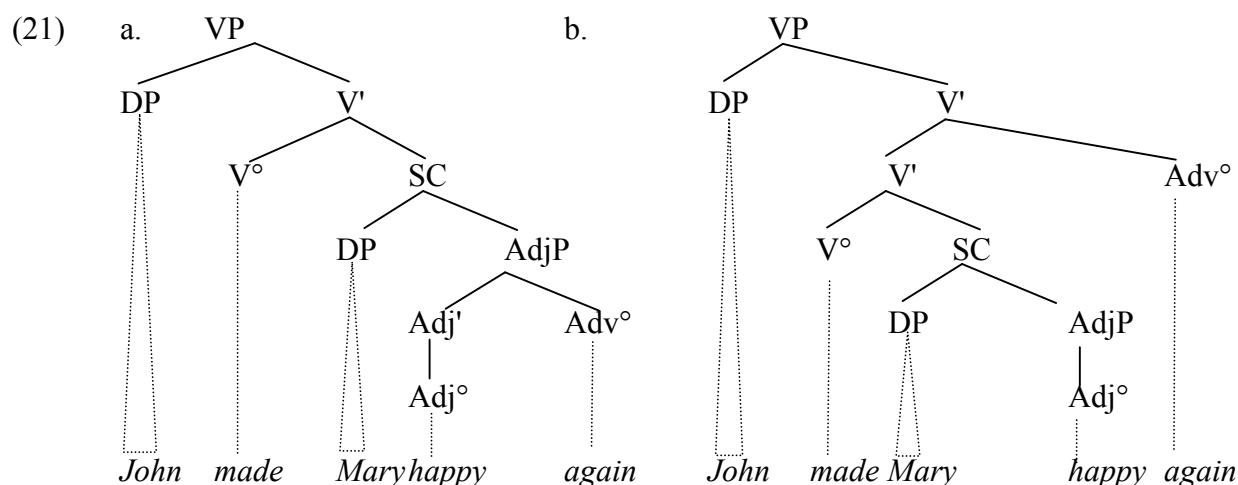

As shown in the Generative Semantics literature from the late 60s and early 70s, similar scopal

ambiguities are present with simple ditransitive and other change-of-state verbs, as illustrated in

(22) below:

(22)   a.   John opened the door again
                                    i.   The door was open before, and now it's open again
                                    ii.   John opened the door before, and he did it again
                    b.   Mary gave the book to Sue again.
                                    i.   Sue had the book before and now she has it again.
                                    ii.   Mary had given the book to Sue before, and now she gave
                                              it to Sue again.

Von Stechow 1995 argued strongly for a Generative Semantics-type analysis of variable scope

for adverbials like *again* in these sentences, within a vP-style syntax. By hypothesis, the

causative verb *open* is made up of a predicate CAUSE (the null v°) syntactically taking a

propositional complement headed by the intransitive predicate *open* (Adj°). The scope of *again* will then depend on whether it is adjoined to the embedded predicate or the matrix CAUSE predicate, just as it does in the clearly biclausal structure illustrated in (22) above.

(23)   a.   vP   b.   vP
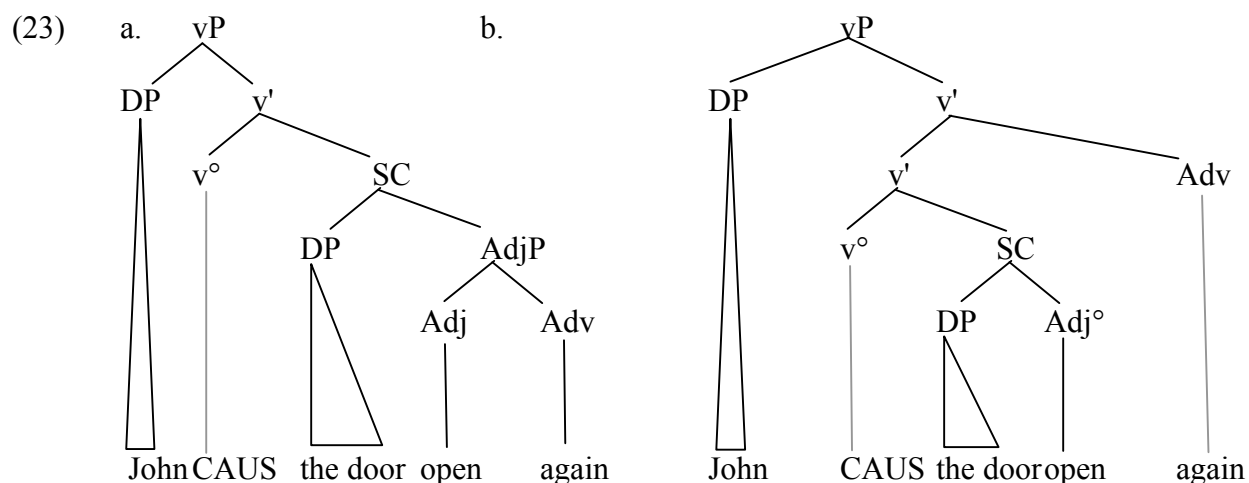
Beck and Johnson (2004) framed the same argument for ditransitive verbs, where *again* modifying the upper Larsonian VP-shell (vP) give the reading of iterated causation of the event, and *again* attached to the lower VP shell (SC) gives an iterated result. In a ditransitive verb, the result denoted by the lower VP shell seems clearly to be stative location or possession. This can very clearly be seen in another dataset from McCawley (1968, 1974) and Ross (1976): the interpretation of temporal modifiers with ditransitive verbs:

(24)   Temporal modifiers modifying the result of the event:
           a.   Mary gave Bill the car until 3 o'clock (earlier this morning)
           b.   Mary lent her hat to Bill for 2 hours

Here, it is not the action itself that lasts for two hours, but the state of Bill's having the hat's, or Bill's having the car. A similar effect can be seen with *open* and related change-of-state verbs:

(25)   a.   John opened the window for five minutes
              b.   Mary turned the tap to 'cold' for five minutes.

If the resultant state is represented in the structure in a constituent independentof the constituent

denoting the initiating action, in a VP-shell structure like those above, it is easy to treat the

modification of that resultant state by a temporal adverbial; if it is not present, on the other hand,

the syntax/semantics interface becomes remarkably complicated, as argued in detail by von

Stechow (1995).

On this view of the contribution of the two different portions of the verbal predicate, the

upper v° has its own semantic content, having to do with event initiation and causation. As

argued above, the external argument, then, is semantically related to this upper v°, and is in fact

not 'selected' by the root V° at all, though obviously the nature of the causation or event-

initiation in which the external argument engages will be affected by the content of the V° head,

since different events require different types of initiation.

For at least certain verb classes, then we have some semantic evidence that the verb is

made up of a matrix external-argument-introducing projection, v° involving causation or

initiation, and a formally independent lexical projection, which seems to denote a result state and

selects the internal arguments of the verb, and contributes the 'root' meaning of the predicate. The

role of the vP hypothesis in accounting for event structure and event decomposition has been the

focus of more than a decade of intensive study; see Ramchand (this volume) for an extensive

presentation. Some of the other key research in this area is represented in Travis (1991, to

appear), Borer (1993, 2005), Alexiadou, Anagnostopoulou, and Everaert (2004), and Ramchand

(2008). See also Folli (2002), Pylkkanen (2002), Basilico (2003), Tomioka (2006), Baker and

Collins (2006), Zubizarreta and Oh (2007), Merchant (2008) among many, many others, for

related work.

A very well-known set of empirical objections to the decompositional project of the Generative Semantics framework were offered by Fodor (1970); space does not allow for a detailed rebuttal of these points in the context of this article, but for one explicit treatment of Fodor's arguments within the vP framework, see Harley (to appear). Although the vP hypothesis is at this point integral to the Minimalist framework's treatment of argument structure, intra- and inter-framework debate continues. For contrary opinions and criticism from outside the Minimalist program, see Kiparsky 1997, Weschler 2005, Horvath & Siloni 2002, among others.

3. Alternatives within Minimalism

Alternatives within Minimalism to the general proposal outlined above range from relatively minor amendments to wholesale rejections. Above, considerations of compositionality are taken to restrict unwanted configurations in the general spirit of the Theta-Criterion: The notion that all θ-roles must be assigned, and that all DPs must bear a θ-role, follows immediately from the Full Interpretation requirement in combination with the semantic types of the constituents involved.

It is less clear that the uniqueness desideratum on θ-role assignment follows so directly. Does it follow that a single DP must bear only a single θ-role? Hornstein (2001) argues extensively for an approach according to which one DP may enter into thematic relations with more than one predicate, or indeed, may enter into thematic relations with the same predicate more than once. In his formulation, θ-roles are features of predicates, checked by DPs, and configurations in which a single DP checks more than one θ-role are the classic configurations of obligatory control and anaphor binding. A DP may Merge with a predicate, checking its θ-feature, and subsequently undergo Move—Copy and re-Merge—to check the θ-feature of another predicate.

Interpreted in the terms of the present account, it seems clear that Copy and re-Merge could indeed result in a situation in which a single argument satisfied multiple predicates via function-application. Restricting the semantic possibilities opened up by the Copy and re-Merge treatment of Move would require additional stipulation. This aspect of Hornstein's proposal, then, is fully consistent with a Fregean approach to syntactic compositionality, assuming that other issues associated with the approach (distribution of overt vs PRO realizations of traces, sideways movement, etc.) can be adequately worked out.

Hornstein's proposal that θ-roles are features, needing to be syntactically checked, however, is not consistent with the Fregean approach; syntactic features, like θ-roles themselves, would be additional mechanisms intended to replicate what the Full Interpretation constraint and a compositional semantics can already accomplish. Consequently, analyses like that of Siddiqi (2006) which critically rely on a featural conception of θ-roles are not consistent with the general picture presented here, and the phenomena accounted for thereby must be treated in some other way. Adger (2003)'s approach, according to which semantic roles are necessarily associated with c-selectional features, may represent a middle road which could allow a reconciliation of the present approach and the syntactic feature-checking view of θ-roles.

A semantically decompositional yet syntactically more conventional approach to θ-roles is proposed in Reinhart (2002) and later work. In Reinhart's proposal, θ-roles are bundles of LF-interpretable features, analogous to the way that phonemes are bundles of PF-interpretable features like [±voice], [±velar], etc. Predicates in the lexicon bear clusters of these features, which are [±c] (for 'cause') and [±m] (for 'mental'); these features, in all combinations, define nine possible θ-roles. Reinhart's proposal is semantically decompositional, though not in the precise way proposed here, and can accurately characterize the class of verbs which participate

in the causative/inchoative alternation (those with a [+c] external role—a Causer, rather than an Agent). A syntactic mapping procedure relates these clusters of features to particular syntactic positions, deriving a version of UTAH, and the syntax passes these features through to the LF representation, where they are mapped to neo-Davidsonian semantic interpretations, as illustrated in (26) below:

(26)   ∃e (wash(e) & [+c+m](e)=Max & [-c-m](e)=the child))   (=Reinhart's (4d))

Reinhart's system obtains its empirical results in a Lexicalist paradigm, however, in which productive arity alterations apply presyntactically to the thematic feature bundles carried by verbs, altering the way in which they map to the syntax. In this sense, the propsal is really intended as a revision and improvement on the GB system, where separate, generative procedures changed lexical representations presyntactically. While Reinhart allows for the possibility that some morphological arity-affecting operations may apply in the syntax, she makes this a parameterizable option: there are Lexicon languages, in which arity adjustments are presyntactic, and Syntax languages, in which the same effect is obtained by a syntactic operation. In her system, for example, in Dutch, reflexivization reduction applies in the lexicon, while in German it applies in the syntax, accounting for the absence of lexical sensitivity in the latter case. In this regard, Reinhart's system is emphatically non-Minimalist, espousing a separate, parametrically varying module of lexicon-internal operations, as well as syntactic equivalents of these operations. Reinhart's interesting empirical results notwithstanding, a single-engine approach like that outlined above seems to be more in tune with Minimalist desiderata, and seems clearly also able to capture important empirical generalizations.

4. Conclusions

Although in this article I can only sketch the overall direction taken by a very large and empirically rich body of work spread over the past two decades, I hope at least to have motivated some of the core theoretical tools and concepts that are currently deployed in Minimalst analyses of argument structure. In particular, it seems clear that it is possible and desireable to do away with the GB theta theory; given that no theta-theory is more Minimalist than some theta-theory, this is a desireable outcome. Further, I hope to have shown that semanticizing the original Hale and Keyser l-syntactic structures, in the appropriate way, gives robust and interesting results.

Many problems and questions remain, of course. Among other things, one open research question involves certain aspects of verb argument-structure flexibility that are not obviously accounted for by the three basic verb frames outlined above in (11). The parametric variation observed by Talmy (1985, 2000) in the availability of manner-of-motion constructions crosslinguistically has been a major topic of investigation, as has the as well as the selected vs. unselected-object distinction in resultative constructions ('argument sharing', see, e.g. Levin and Rappaport 2001) but some of the core properties of these constructions remain mysterious— particularly how to account for argument-sharing effects in these structures. For relevant discussion see Marantz (to appear), Zubizarreta and Oh (2007), among others.

Finally, it is worth noting that the adoption of a Neo-Davidsonian approach to argument structure interpretation, in combination with Bare Phrase Structure, does not capture the core explanation that the Hale and Keyser program was intended to discover, namely the reason for the apparent paucity of θ-roles. Recall that H&K wished to explain the observed restriction on the maximum number of arguments that a single verb can have—apparently around 3. H&K's view of θ-roles was essentially purely configurational in nature, and consequently syntactic

restrictions on possibile configurations was the reason that there cannot be an arbitrary number

of θ-roles. In the original formulation, X-bar theory provided a natural source of such a

restriction—the most arguments that could be involved in the lower VP were two: a Spec and a

Comp, and only one new argument cound be introduced in the upper VP, in its Spec. Without X-

bar theory, and with a Neo-Davidsonian semantics and a Bare Phrase Structure syntax, the

limitation on available θ-roles must again be stipulated. Apparently, there is a functor Agent

(e,x), but not other imaginable possible functors. It is possible that derivational constraints on

syntactic structures (cyclic heads, phases, interface requirements) can yield the appropriate

restrictions (see, e.g. Boeckx 2008 for a proposal), but the original H&K explanadum still

requires more work to understand.

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[1] Notice that there are two possibilities, both available in English: *kisser* can refer to a person who kisses, or to the mouth (the instrument of kissing). Examples like 'transmission' are similar, only with different possibilities for the indexed θ-role: $Event_i$, $Theme_i$, or $Instrument_i$.

[2] The modification I have introduced here is just to turn H&K's complement clause from a mediated predication (with a lower V equivalent to something like Bowers 1993's PredP) to a small clause; this revision is intended as innocent here, to facilitate exposition. More substantive issues do depend on this modification, but unfortunately cannot be dealt with in the scope of this article. See Harley (2008:42-44), Harley (to appear) for discussion.

[3] At first, Hale and Keyser proposed a structural account of the impossibility of certain location verbs (e.g. **church the money*), but given the availability of syntactically and semantically equivalent verbs (e.g. *shelve the books, corral the horse*), a different take on the productivity of this process seems appropriate (see Kiparsky 1997 and Harley 2008b for discussion).

[4] See Mateu (2002) and subsequent work for extended development of this interpretation of Hale and Keyser's proposals.

[5] In some languages, such as Persian (Farsi), such unincorporated 'light' verb plus non-verbal predicate constructions ('complex predicate constructions') are the primary exponent of verbal concepts, and, consistently with H&K's structures, can be sorted into the three primary classes shown here. For further discussion, see Folli, Harley and Karimi (2005).

[6] N.B.: The unincorporated 'unergative' structures above contain the only direct objects in this framework that are <u>not</u> 'inner subjects'. These are the arguments bearing Dowty (1992)'s "Incremental Theme" theta role. See Harley (2005) for discussion.

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[7] The Inner Subject of these verbs, the Theme argument, will raise to Spec-TP to check Case features when the upper V is specifierless, as no higher argument is present in Spec-VP to intervene. Inchoative verbs are thus unaccusative, intransitive verbs with no external argument and with a derived subject created by movement from within VP.

[8] Speas 1990:94-96 also adopts a version of the H&K proposal.

[9] Pesetsky (1995) and Harley (1995, 2002) propose prepositional lower shells for ditransitives; in the latter, a connection is drawn between the prepositional relation denoting 'have' identified by Kayne (1992) and Freeze (1993) and the identity of the lower shell. See discussion in section 2.5 below.

[10] Nunberg, Sag, and Wasow (1994) argue that the asymmetric distribution of idioms is not indicative of any grammatical constraint but rather has an independent explanation in terms of a statistical conspiracy of the distributions of typical subject-predicate asymmetries involving animacy effects and topic-comment relations, and present some putative counterexamples; Horvath and Siloni (2002) also dispute the strength of the generalization. See Harley (in prep) for a critique.

[11] e = individuals, s= events, t = truth values

[12] An interesting ramification of Kratzer's proposal in conjunction with the framework described here concerns the denotation of PPs. Barry Schein (p.c.) notes that a Davidsonian treatment of modifiers entail that PPs are predicates of events, e.g. in sentences like *John buttered the bread in the kitchen*. However, this is incompatible with the notion that PPs can, at least in some cases, serve as arguments of the verb, as in *John put the food in the kitchen*, as such arguments are not predicates of events. If PPs can truly be arguments, as assumed here, and if Kratzer's approach is

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on the right track, it entails that a PP like *in the kitchen* is not univocal, but is sometimes of type

<e> and sometimes of type <s, t>.