

*Root Bound*

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**Ro[u:]ting the interpretation of words**Artemis Alexiadou  
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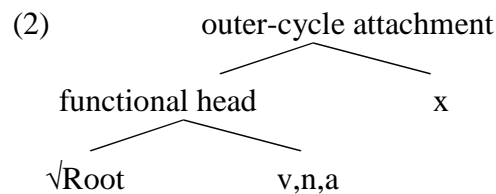
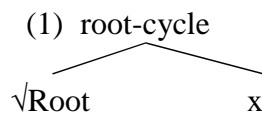
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**1. Introduction**

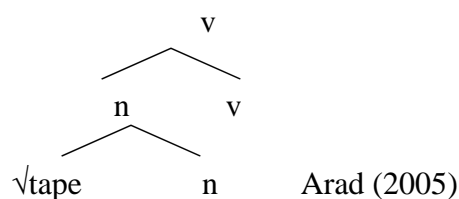
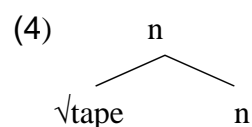
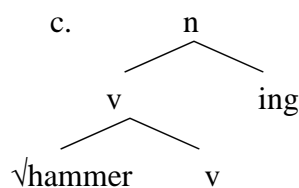
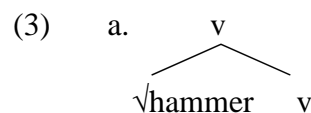
Word formation in Distributed Morphology (see Arad 2005, Marantz 2001, Embick 2008):

1. Language has atomic, non-decomposable, elements = roots.
2. Roots combine with the functional vocabulary and build larger elements.
3. Roots are category neutral. They are then categorized by combining with category defining functional heads.

- There are two cycles for word-formation (Marantz 2001/to appear):

*word formation from roots**word formation from words***(2) Locality constraint on the interpretation of roots/Cyclic generalizations:**

Roots are assigned an interpretation in the environment of the first category-assigning head with which they are merged. Once this interpretation is assigned, it is carried along throughout the derivation. Arad (2005), Embick (2008)



Merger with root implies:

1. negotiated (apparently idiosyncratic) meaning of root in context of morpheme
2. apparent semi-productivity (better with some roots than others)
3. meaning of construction cannot be an operation on “argument structure” but must depend on root semantics independent of argument structure
4. corollary of the above: cannot involve the “external argument” of the verb

Merger above a category-determining morpheme implies:

1. compositional meaning predicted from meaning of stem
2. apparent complete productivity
3. meaning of structure can involve apparent operation on argument-structure
4. can involve the external argument of a verb

Marantz (2001/to appear)

Arad (2005):

**1. The language specific property:** Roots may be assigned a variety of interpretations in different morpho-phonological environments. These interpretations, though retaining some shared core meaning of the root, are often semantically far apart from one another, and are by no means predictable from the combination of the root and the word-creating head.

- (5)  $\sqrt{\text{šmn}}$
- |   |   |
|---|---|
| a. CeCeC (n) <i>šemen</i> ‘oil, grease’ | d. CaCeC (adj.) <i>šamen</i> ‘fat’            |
| b. CaCCeCet (n) <i>šamenet</i> ‘cream’  | e. hiCCiC (v) <i>hišmin</i> ‘grow fat/fatten’ |
| c. CuCaC (n) <i>šuman</i> ‘fat’         | f. CiCCeC (n) <i>šimen</i> ‘grease’           |

**2. The universal property:** The ability to be assigned multiple interpretations is strictly reserved for roots. Once the root has merged with a category head and formed a word (n, v, etc.), its interpretation is fixed, and is carried along throughout the derivation. This locality constraint holds across all languages.

**Consensus:** roots cannot be interpreted in isolation. But there is disagreement concerning the following issues:

- (i) What exactly (i.e. what blocks of structure) do we need in order to interpret a word?
- (ii) How much of a word's meaning is determined by the root and how much by the (functional) structure?
- (iii) What kind of features do roots have, if any?

In section 2 I am concerned with primarily the first two questions in the domain of participle formation and nominalization. In section 3 I turn to question (iii) by focussing on transitivity alternations.

Section 2 raises some questions for the locality constraint. Section 3 discusses the division of labor between roots and functional structure. If root meaning is minimal, then functional structure should be substantial.

## 2. Word (non-)compositionality

### 2.1 Greek participles

Anagnostopoulou (2003), Alexiadou & Anagnostopoulou (2008), Anagnostopoulou & Samioti (forthcoming):

Greek has two participial constructions that can be used in an adjectival function: the *-menos* and the *-tos* participles:

- (6) a. vraz-o ‘boil-1sg’                      vras-**men**-os    vras-**t**-os            “boiled”  
 b. psin-o ‘gril-1sg’                        psi-**men**-os    psi-**t**-os            “grilled”

There are several semantic and syntactic differences between the two constructions (see Anagnostopoulou 2003 and Alexiadou & Anagnostopoulou 2008 for discussion and further references).

#### I. Differences in interpretation:

- (7) a. #Afti I varka ine fusko-**meni** alla den  
 This the boat is pumped but not  
 tin exi fuskosi kanis akoma  
 it has pumped noone yet  
 'This boat is pumped up but noone has pumped it up yet'  
 b. Afti i varka ine fusko-**ti** alla den  
 This the boat is pump-ed but not  
 tin exi fuskosi kanis akoma  
 it have pumped noone yet  
 'This boat is of the type that can be pumped up but noone has pumped it up yet'

The *menos*-participle in the first conjunct of (7a) denotes that the boat is in a state resulting from a pumping event. Negating this event in the second conjunct of (7a) results in a contradiction. On the other hand, the *-tos* participle in (7b) does not entail the existence of a prior event. Therefore, the negation of the event in the second conjunct does not lead to a contradiction.

#### II. Adverbial modification: the *-menos* participle can be modified by manner adverbs, the *-tos* one cannot:

- (8) a. Ta malia ine halara pleg**mena**  
 The hair are loosely knitted  
 The hair is loosely arranged  
 b. \*Ta malia ine halara **plehta**  
 The hair is loosely knitted

The *-menos* participle licenses instrumental PPs, the *-tos* participle doesn't:

- (9) a. Ta malia ine pleg**mena** me xrisi kordela  
 The hair are knitted with golden lace  
 'The hair is arranged together with a golden lace'  
 b. \*Ta malia ine plehta me hrisi kordela  
 the hair is knitted with golden lace

III. *-menos* participles can license *by*-phrases and control into purpose clauses, *-tos* ones cannot:

- (10) a. Ta keftedakia ine tiganis-**men**-a apo tin Maria  
 The meatballs are fried by the Mary  
 'The meatballs are fried by Mary'
- b. Aftos o pinakas ine zografis**menos** apo mia  
 This the painting is painted by a  
 omadha aktiviston gia na sokarun tus anthropus  
 group activists-GEN for to shock-pl the people  
 'This painting is painted by a group of activists in order to shock the people'
- c. \*Ta keftedakia ine tigan-**ita** apo tin Maria  
 The meatballs are fried by the Mary
- d. \*Aftos o pinakas ine zografis**tos** apo mia  
 This the painting is painted by a  
 omadha aktiviston gia na sokarun tus anthropus  
 group activists-GEN for to shock-pl the people  
 'This painting is painted by a group of activists in order to shock the people'

IV. Not all verbs seem to be able to form *-tos* participles, while they all form *-menos* participles:

- |      |                           |                            |                 |
|------|---------------------------|----------------------------|-----------------|
| (11) | katastrofo<br>destroy-1sg | katestramenos<br>destroyed | *katastrep-t-os |
|      | dolofono<br>murder-1sg    | dolofonimenos<br>murdered  | *dolofonitos    |
|      | anthizo<br>blossom-1sg    | anthisemenos<br>blossomed  | *anthistos      |
|      | asprizo<br>white-1sg      | aspisemenos<br>whitened    | *aspristos      |

V. *-tos* participles can have idiomatic readings:

- |         | <i>Verb</i>       | <i>Participle</i>        | <i>Idiomatic interpretation</i> |
|---------|-------------------|--------------------------|---------------------------------|
| (12) a. | kolao<br>glue-1sg | kolitos<br>lit. glued    | 'close friend'                  |
| b.      | ftino<br>spit-1sg | ftis-tos<br>lit. spitted | 'spitting image'                |

- It seems then, in agreement with Marantz (2001/to appear), that *-tos* participles should involve root-affixation, while *-menos-* participle should include some functional structure (e.g. vP and VoiceP to account for the modification facts and the licensing of agentive PPs respectively).

- **Two problems for this view:**

**A) Ambiguity with the *-menos* forms:** Anagnostopoulou (2003), following Kratzer (2001), points out that *-menos* participles can denote both target and resultant states. Target state

participles in (13) are compatible with the adverbial *akoma* 'still', while resultant state participles in (14) are incompatible with it:

- (13) a. Ta pedhia ine akoma krimena  
The children are still hidden  
b. Ta lasticha ine akoma fuskomena  
The tires are still pumped up
- (14) a. To theorima ine (\*akoma) apodedigmeno  
The theorem is (still) proven  
b. Ta ruxa ine (\*akoma) stegnomena  
The clothes are (still) dried

Target state *-menos* participles do not license agent and instrument PPs and agentive adverbials. As (15) shows, *by*-phrases and instrument phrases are incompatible with *akoma* 'still':

- (15) a. Ta lastixa ine (akoma) fuskomena (\*apo tin Maria)  
The tires are (still) inflated by the Mary  
The tires are still inflated by Mary  
b. Ta lastixa ine (akoma) fuskomena (\*me tin tromba)  
The tires are (still) inflated with the pump  
The tires are still inflated with the pump

- Voice modifiers (agent-oriented) vs. v modifiers (result-oriented):

manner adverbs are distinguished into those that modify the visible result of an event such as 'loosely' (result-oriented) and manner adverbs that modify the initiation of the action such as 'carefully' (agent-oriented); the former are compatible with *akoma* (16), the latter are not (17).<sup>1</sup>

- (16) To thisavrofilakio itan (\*akoma) prosektika anigmeno  
The safe was (still) cautiously opened  
The safe was still cautiously opened'

- (17) To thisavrofilakio ine (akoma) halara klismeno  
The safe is still loosely closed  
The safe is still loosely closed

The above facts suggest the following structures. Assuming that *-t-* and *-men-* are realizations of the Asp head that is involved in the formation of participles (the stativizer in Embick 2004):

(I) *-tos* participles which lack implication of an event (no result-oriented modification,) and agentivity (as they do not tolerate agent-oriented modification, nor *by*-phrases and instruments) involve root-attachment:

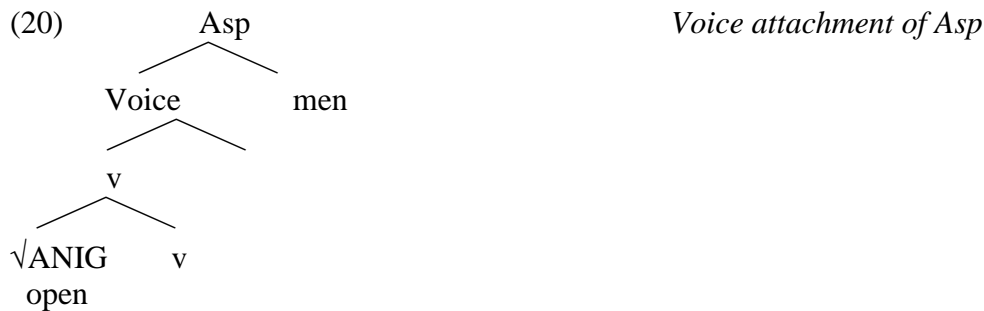
<sup>1</sup> See Eckardt (2003) for further details and references. Result oriented adverbs seem to be restricted to verbs that denote events with a resultant object.



(II) *-menos target state* participles which include implication of an event but lack agentivity (no agent-oriented modification, no by-phrases and instruments) involve v attachment:



(III) *-menos resultant state* participles which include both implication of an event, and agentivity (as diagnosed by agent-oriented modification and the licensing of by-phrases and instruments) involve Voice attachment:



**B) Idiomatic readings with the -men-os form:** (Anagnostopoulou & Samioti forthcoming, Samioti forthcoming):

(12), repeated below, showed that **-tos** participles often have idiomatic meanings. However, the surprising fact is that even **-menos** participles can have idiomatic readings:<sup>2</sup>

	<i>Verb</i>	<i>Participle</i>	<i>Idiomatic interpretation</i>
(12) a.	kolao glue-1sg	kolit-os lit. glued	‘close friend’
b.	ftino spit-1sg	ftis-tos lit. spitted	‘spitting image’

<sup>2</sup> Interestingly most of the verbs they are derived from are psych verbs with an experience and subject matter/target argument, Pesetsky (1995).

(21)	<i>Verb</i>	<i>Participle</i>	<i>Idiomatic interpretation</i>	
a.	kolao glue-1sg	koli-menos opados lit. glued fan	'obsessed'	
b.	ftino spit-1sg	ftis-menos lit. spitted	'ignored'	
c.	pleko knit-1sg	plegmenos lit. knitted	'in trouble'	cf. plehtos
d.	strivo twist-1sg	strimenos geros lit. twisted old man	'crotchety old man'	cf. striftos
e.	ftano reach-1sg	ftasmenos epistimonas lit. reached scientist	'successful scientist'	

- As the authors note, the idiomatic interpretation disappears in the presence of manner (Voice) modification, agent and instrument PPs:

(22)	a.	prosektika strimenos/plegmenos carefully twisted/knitted
	b.	strimenos apo kation/me kati twisted by somebody/with something

- But note: even in the presence of **result oriented** (v) modifiers, the idiomatic interpretation disappears, even for those participles that only have the target state interpretation as the ones in (23b):

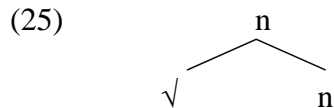
(23)	a.	halara strimenos/halara kollimenos/halara plegmenos loosely twisted/ loosely glued      loosely knitted
	b.	varia anthismeni/adinatismeni heavily blossomed/thinned

A similar state of affairs is observed in the domain of nominalization.

## 2.2 Greek Nominalizations

Again at first sight, the view in (1)-(2) correctly predicts the behaviour of (24a-d), i.e. root derivation leads to special meanings; all the nouns in (24) do not contain an overt nominalizer (the endings signal declension class):

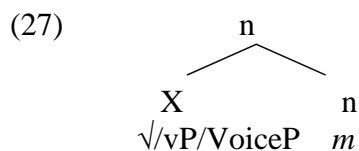
(24)	a.	kub-i button / 'how someone ticks'
	b.	stavr-os cross/difficulty
	c.	psih-i soul/nobody
	d.	kol-a glue/sheet of paper



Consider, however, verb derived nominals I focus here on **-m-** nominals, i.e. nouns that contain the nominalizer affix **-m-**. Several of these are three ways ambiguous between an Arguments supporting reading (ASN), an R(eferential)one, see Grimshaw (1990), Borer (1993, 2001), and an idiomatic one.

- (26)
- |    |   |                    |                  |       |
|----|---|--------------------|------------------|-------|
| a. | to <b>kolima</b>                              | tu vazu            | diirkise 5 lepta | ASN   |
|    | The glue-ing the-dress-gen took 5 minutes     |                    |                  |       |
|    | The glueing of the vase took 5 minutes        |                    |                  |       |
| b. | to <b>kolima</b>                              | den ine kalo       |                  | R     |
|    | the glueing is not good                       |                    |                  |       |
| c. | to <b>kolima</b>                              | tu Jani me ti bala | ine ipervoliko   | idiom |
|    | the glueing the John with the ball is extreme |                    |                  |       |
|    | John's obsession with soccer is extreme       |                    |                  |       |

A simple way to derive this ambiguity would be to say that ASN nominals contain some functional structure, while the other two are root derived (Alexiadou 2001).



- But, there are at least three arguments against this view:

1. Morphology: the morphological decomposition of these nominals suggests the presence of a verbal head within all of them.

(28) Root- verbalizer-nominalizer

Greek: -iz-, -on-, -en -ev- -az-, -a-o, cf. Alexiadou (to appear), Charitonidis (2005):<sup>3</sup>

- (29)
- |    |                      |    |          |          |
|----|----------------------|----|----------|----------|
| a. | aspr-iz-o, plut-iz-o | b. | pag-on-o | ler-on-o |
|    | whiten become rich   |    | freeze   | dirty    |
| c. | sten-ev-o            | d. | kol-a-o  |          |
|    | tighten              |    | glue     |          |

- (30)
- |               |              |                |             |
|---------------|--------------|----------------|-------------|
| to aspris-m-a | to pago-m-a  | to stenema     | to kolima   |
| the whitening | the freezing | the tightening | the glueing |

In fact, across languages we have evidence for a morphological structure as in (28).<sup>4</sup>

<sup>3</sup> Here I take non-contracted forms of verbs to be similar to forms containing an overt verbalizing affix. It is not clear to me as to whether or not these vowels are thematic vowels. Historically, one observes that former contracted forms acquired a verbalizing affix, and forms with a verbalizing affix developed into forms containing a vowel. In Modern Greek some verbs exhibit both forms, the one with the vowel and the one with the affix, suggesting that both are verbalizers, inserted in v.

<sup>4</sup> Cf. Harley (to appear) for English. cf. Alexiadou & Schäfer (2008) for German: -ier-:

(i) a. implement - implement-ier-en Implement-ier-ung



2. Productivity: Such formations are relatively productive; (31) provides a list based on Samioti's (forthcoming) list of idiomatic expressions with participial forms:

	<i>Noun</i>	<i>non-idiomatic</i>	<i>idiomatic</i>
(31) a.	to kub-o-m-a	the buttoning	the reservation (withholding)
b.	to spa-sim-o	the breaking	the unerving?
c.	to fti-sim-o	the spitting	the ignoring
d.	to tsib-i-m-a	the stinging	the infatuation
e.	to kurd-is-m-a	the setting of a clock	the unnerving?

- **Conclusion:** nominals with the nominalizer –m- contain a verbal layer (v).

- When is an idiomatic interpretation not available?

1. Presence of AS, as argued for in Borer (2008), cf. Alexiadou (to appear):

(32) a.	to kuboma tu paltu kratise 3 lepta	ASN, not idiom; not R
	The buttoning the coat-gen took 3 minutes	
	The buttoning of the coat took 3 minutes	

2. Presence of event modification, cf. Larson (1998):<sup>5</sup>

(32) b.	to ksafniko spasimo	R-reading, not idiom
	The sudden breaking	
c.	halaro kuboma	R reading, not idiom
	loose buttoning	
d.	stathero kurdisma	R-reading, not idiom
	solid setting	

We thus have to distinguish between two effects, as in the domain of participles:

1. The presence of AS (and Voice modification) that allows only the ASN interpretation.
2. The presence of event modification that does not allow an idiomatic interpretation but can still have a number of other readings (object, simple event, result, all subsumed under the label R-interpretation here).

- How can we account for the AS effect?
- How can we account for the modification effect?

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	b.	Kode	-Kod-ieren	Kod-ier-ung
(ii) a.		An dieser <i>Implementierung</i> aendern wir bis Update erst einmal nichts weiter. In this implementation we do not change anything till the next Update		
	b.	Ob man durch einen Trick die <i>Kodierung</i> entfernen kann, kann ich nicht sagen if one can remove the code with a trick I cannot say		

<sup>5</sup>Roßdeutscher (2007) took the modification test to suggest the presence of an event head in ASN and R nominals, see also Alexiadou & Schäfer (2008):

(i) a.	die grobe Messung	b.	eilige Lieferung
	the rough measurement		fast delivery

She observes that in these cases the adjective *fast* and/or *rough* modifies the event of measuring or delivering respectively, even if the nouns themselves have an R interpretation. Assuming that event modification makes necessarily reference to the presence of v, this means that both AS and non-AS nouns contain v.

## 2.3 Argument structure

In agreement with Borer (2008) and Acquaviva (2008):

1. Lacking syntactically legible information, roots cannot project: there can be, then, no 'RootP', and no argument may therefore appear in the specifier or complement position of a root.
  2. Only functional heads/particles/small clause structures introduce arguments.
    - Following Kratzer (1996), Voice is responsible for the external argument and Voice modifiers.
    - Internal arguments are licensed via particles/prepositions/small clauses (more on that in section 3).
- How big is the relevant domain for compositional interpretation?

The structure of –m- nouns:

(33) a. [DP [nP m [VoiceP [vP [Root]]]] *compositional*

- Functional layers that introduce arguments are interpreted compositionally, Borer (2008).

b. [DP [nP m [vP [Root]]] *may be non-compositional*

Note here that the presence of a possessor does not yield compositionality pointing to a difference between arguments and possessors, see (26c):<sup>6</sup>

(34) to kolima tu Petru me ti bala  
the glueing the Peter-gen with the ball  
Peter's obsession with soccer

## 2.4 Modification

What kind of modification are we dealing with?

(35) a. megalo kolima                      b. poli strimenos  
big obsession                              very twisted

In (34) we have instances of degree modification and the idiomatic reading is preserved. The relevant kind of modification is 'event' modification/direct/adverbial modification, see Alexiadou & Wilder (1998), Cinque (2008).

- The 'adverbial' reading is attributed to the fact that the modifier predicates of the event (Larson 1998) v introduces.
- But this means that the modifier is able to see into the word-composition forcing thus a compositional interpretation.

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<sup>6</sup> See note 2. In the nominalization patterns the experience appears in the genitive and the subject matter in a PP. As McGinnis (2000) notes, the PP is not an argument of the 'root'.

### 3. Roots and features

#### 3.1 The categorization assumption

Acquaviva (2008):

"..Roots are smaller; in this sense, they have no meaning by themselves but co-occur with category-assigning heads to form interpretable typed grammatical entities". ⇒ The categorization assumption in DM.

(36) CATEGORIZATION ASSUMPTION: from Embick (2008)

Roots cannot appear without being *categorized*; Roots are categorized by combining with category defining functional heads.

Acquaviva (2008):

Roots are the names that, attached to elements which specify a type, identify one particular concept belonging to that type. The template [[ROOT] n] specifies entity-referring concepts; arguably [[ROOT] v] specifies events".

Along the same lines, one could argue that [[ROOT] a] specifies properties/states.

On this view, we would expect that the combination between category assigning heads and different roots to be relatively free. But this is not the case within a language and across languages, i.e. some roots have a strong 'preference' for a particular template, and related concepts do not identify elements of the same type across languages.

- Two possible answers to this problem.

1. Encyclopedia: there are certain templates that cannot be easily interpreted as events/states/entities. If this is the case, reference is made to a conceptual system of sorts.

2. Cross-linguistic variation: Presumably this relates to the inventory of morphemes, i.e. the division of labour between roots and functional vocabulary. Some languages have more roots (English) than others (Hebrew), see Arad (2005).

But there have been arguments that certain aspects of the behavior of words make reference to a relatively rich ontological root classification; the case in point: verbal alternations.

#### 3.2 Aktionsart properties

Harley (2005) argues that roots should be classified along two dimensions, the  $\pm$ boundedness and the  $\pm$  complement dimension:

**Table 1**

	no complement		Complement	
	Bounded	unbounded	bounded	unbounded
event	hop	sleep	kick	push
thing	foal	drool	N/A?	N/A?
state	flat	rough	clear	?

In Harley's treatment of denominal verbs in English, a bounded root in direct object position of *v* gives us telic predicates, while unbounded roots result in atelic predicates. Roots that denote things cannot select arguments.

- Bounded events as opposed to bounded things are not accomplishments:

- (37)
- Sue hopped #in 5 minutes/#for 5 minutes
  - Sue danced for 5 minutes/#in 5 minutes
  - The mare foaled in two hours/#for two hours
  - The baby drooled for two hours/#in two hours
  - Sue kicked the wall #for 5 minutes/#in 5 minutes
  - John pushed the cart for 5 minutes/# in 5 minutes

- Occasionally, as Harley notes, one needs to make reference to a bigger structure; e.g. with change of state verbs involve a SC structure and in this case it is the status of the small clause that counts as event delimiter (38a-b); de-adjectival roots based on unbounded state roots tend to be atelic (38c):

- (38)
- Sue cleared the table #for 5 minutes/in 5 minutes
  - Sue cleared tables for 5 minutes
  - Bill lengthened the rope for 5 minutes

But recall:

1. Templatic meaning: The template [[ROOT] n] specifies entity-referring concepts; arguably [[ROOT] v] specifies events and [ROOT] a] specifies properties/states.
2. Roots cannot project.
3. ± Boundedness has been argued to make reference to the presence of functional structure in different domains:

In the domain of what we call things:

- (39) [DP [Quantity #P [ClassifierP division [LD]]]] Borer (2005)

In the domain of what we call events:

- (40)
- [EPoriginator of process [AspectQ aspect of quantity [LD]]] Borer 2005
  - [VoiceP [vP = event [Root/SC ]]]  
Alexiadou, Anagnostopoulou & Schäfer (AAS) 2006, Marantz 2005, Harley 2007
  - [InitiatorP [ProcessP [ResultP]]] Ramchand 2008a

In the domain of what we call states:

- (41) [scaleP [propertyP ]] Ramchand (2008b)

- Open scale adjectives (i.e. relative and partial adjectives such as *tall* and *dirty*) instantiate only scaleP, while total adjectives (*clean*, *dry*) instantiate both categories.
- Non-gradable adjectives are just PropertyP.
- On this view, open scale adjectives are like activity verbs, while closed scale adjectives are like accomplishments.

If we want syntax to view the difference in the examples in (38) then different structures/small clauses should be assumed, see Borer (1991). A bounded root is an aP that contains scale and property, an unbounded one is and aP that contains only scale.

- What about things and events?

Bounded structures will involve structures that introduce individuation; unbounded structures will involve roots, as these are not specified for being count.

### 3.3 Transitivity alternations

- Levin & Rappaport Hovav (2008): a verb meaning may be represented as a predicate decomposition consisting of two components:
  - (i) Event schema: structural component of meaning representing an event type; drawn from a limited inventory consisting of the event types encodable in language.
  - (ii) Root: idiosyncratic component of verb meaning, characterized by an ontological categorization, chosen from a fixed set of types: e.g., state, result state, thing, stuff, container, manner, instrument.

• Canonical realization rules: express how the ontological category of a root determines its integration into an event schema:

- (42)
- a. manner → [ x ACT<*MANNER*> ]  
(e.g., jog, run, creak, whistle, . . . )
  - b. instrument → [ x ACT<*INSTRUMENT*> ]  
(e.g., brush, hammer, saw, shovel, . . . )
  - c. container → [ x CAUSE [ y BECOME AT <*CONTAINER*> ] ]  
(e.g., bag, box, cage, crate, garage, pocket, . . . )
  - d. internally caused state → [ x BECOME <*STATE*> ]  
(e.g., bloom, blossom, decay, flower, rot, rust, sprout, . . . )
  - e. externally caused, i.e. result, state →  
[ [ x ACT ] CAUSE [ y BECOME <*RES- STATE*> ] ]  
(e.g., break, dry, harden, melt, open, . . . )

Roots are integrated into schemas as ARGUMENTS (e.g., (42c)-(e)) or MODIFIERS (e.g., 42 (a)-(b)) of predicates; roots are italicized and in angle brackets; notated via subscripts when modifiers.

- Manner roots modify ACT; result roots are arguments of BECOME:

- (43)
- |    |                                     |                                   |
|----|-------------------------------------|-----------------------------------|
| a. | Kim swept/*Kim broke                | <i>unspecified objects</i>        |
| b. | Kim scrubbed/*broke her fingers raw | <i>non-subcategorized objects</i> |
| c. | Kim broke/wiped the window          |                                   |
|    | The window broke/*wiped             | <i>causative alternation</i>      |

(44) **The Lexicalization constraint:**

A root can only be associated with one primitive predicate in an event structure schema, as either an argument or a modifier

AAS (2006) and Harley & Noyer (2000) propose that verbal meanings represented by a root/core component can be classified as follows, building on Levin & Rappoport Hovav (1995) and Marantz (1997):

- (45) a.  $\sqrt{\text{agentive}}$  (murder, assassinate)  
 b.  $\sqrt{\text{internally caused}}$  (blossom, wilt)  
 c.  $\sqrt{\text{externally caused}}$  (destroy, kill)  
 d.  $\sqrt{\text{cause unspecified}}$  (break, open)

These classes differ in terms of the way in which the events they describe are conceptualized. With *agentive roots* the bringing about of the event requires the presence of an Agent; with *internally caused* roots the cause of the change of state event is linked to properties inherent to the argument undergoing change; with *externally caused* roots the change of state is brought about by an external cause; finally, with *cause unspecified* roots there is no specification of internal vs. external cause.

**Table 2**

agentive roots <b>never</b> alternate	externally caused roots subject to cross-
internally caused <b>do not</b> alternate	linguistic variation, do not alternate in
cause unspecified <b>alternate</b>	English, but do in e.g. Greek

- (46) a. \*John murdered (meaning he got murdered)  
 b. \*John blossomed the flowers/The flowers blossomed  
 c. John broke the window/The window broke  
 d. \*John destroyed/O Janis katastrafike

- But if roots do not have meaning/features of their own, we need to rephrase the above in terms of templatic information.

Recall:

- (47) [[ROOT] v] is an event.

- Can v be of different types? Cause/Become/Do, cf. Dowty (1979), Harley & Noyer (2000).

There is evidence that languages use distinct realizations for these v heads:

Japanese (Harley 2006) and reference therein:

- (48) a. *Morphemes competing to realize vCAUS in Japanese*  
 -Ø-  $\leftrightarrow$ CAUS / [  $\sqrt{\text{I+IV}}$  \_\_\_ v ] (38 Jacobsen roots on the list for -Ø-)  
 -e-  $\leftrightarrow$ CAUS / [  $\sqrt{\text{II+III+XIV+XV}}$  \_\_\_ v ] (120 roots on list)  
 -s-  $\leftrightarrow$ CAUS / [  $\sqrt{\text{V+VI+VII}}$  \_\_\_ v ] (47 roots on list)  
 -as-  $\leftrightarrow$ CAUS / [  $\sqrt{\text{VII+IX+X}}$  \_\_\_ v ] (91 roots on list)  
 -os-  $\leftrightarrow$ CAUS / [  $\sqrt{\text{XI}}$  \_\_\_ v ] (6 roots on list)  
 -se-  $\leftrightarrow$ CAUS / [  $\sqrt{\text{XII}}$  \_\_\_ v ] (6 roots on list)  
 -akas-  $\leftrightarrow$ CAUS / [  $\sqrt{\text{XIII}}$  \_\_\_ v ] (4 roots on list)  
 -sase-  $\leftrightarrow$ CAUS / Elsewhere (no roots on list)

b. *Morphemes competing to realize vBECOME in Japanese:*

- e- ↔BECOME / [ √**I+IX+XII** \_\_\_ v ] (79 Jacobsen roots on the list)
- ar- ↔BECOME / [ √**III+IV** \_\_\_ v ] (79 roots on list)
- r- ↔BECOME / [ √**V** \_\_\_ v ] (27 roots on list)
- re- ↔BECOME / [ √**VI** \_\_\_ v ] (18 roots on list)
- ri- ↔BECOME / [ √**VII** \_\_\_ v ] (2 roots on list)
- i- ↔BECOME / [ √**X+XI** \_\_\_ v ] (14 roots on list)
- or- ↔BECOME / [ √**XIV** \_\_\_ v ] (2 roots on list)
- are- ↔BECOME / [ √**XV** \_\_\_ v ] (3 roots on list) (Elsewhere?)
- ∅- ↔BECOME / [ √**II+VII+XII** \_\_\_ v ] (88 roots on list) (Elsewhere?)

Salish: (Davis 2000): in this language, all intransitives are un-suffixed, but all transitives contain an overt transitivizer (DIR, which entails agency and CAUS, which does not):

- (49)    √k'ác                      √k'ác-s-as                      √k'ác-an-as  
           dry-                        dry-caus-erg                      dry -dir-erg

Greek verbalizers have been analysed by Charitonidis (2005) and Giannakidou & Merchant (1999) as having the semantics of a Cause/Become component.

- (50)    -iz-, -on-, -en- -ev- -az-  
           aspr-iz-o,            plut-iz-o  
           whiten                become rich

What could be the advantage of that?

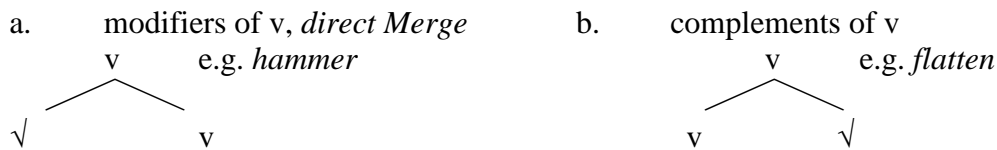
- Alternating verbs contain a CAUSE/BECOME v.
- Non-alternating verbs, especially agentive ones are necessarily associated with a DO v.
- 'Externally caused' verbs are DO verbs in English but CAUSE/BECOME ones in other languages.
- How does it follow that if DO is present the Agent performing the doing has to be represented?

If there is an ACT/DO predicate in the structure, it necessarily requires an Agent to perform it and this should follow from a system such Kratzer's (1994) and/or Doron's (2003).

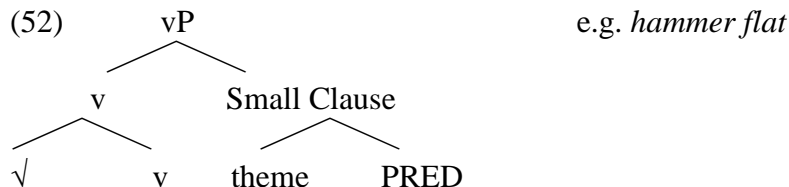
- But there are good arguments as to why we do not want BECOME/CAUSE/DO predicates in the syntax, see Embick (2004), Borer (2005), Ramchand (2008a), Schäfer (2008).
- How can we make sense of the causative alternation?
- **Proposal:** causative semantics emerge in particular structural configurations (not necessarily telic and independently of the 'ontological' classification of root; Greek provides direct evidence for that).

Merge in combination with root ontological classification (Embick 2004), cf. Levin & Rappaport Hovav's (2008) lexicalization constraint:

(51) *Two ways in which roots combine with v*



The structure in (51a) can license secondary resultative predication. In that case the element that appears in the complement of v cannot be a bare root.



As Embick suggests, direct merge has semantic consequences. It specifies the **means** component of the complex predicate. Pattern (51a) seems to be reserved for ‘state’ roots

- Greek shows that the pattern in (51b) is not reserved for ‘state’ roots.

Note that ‘v modifier roots’ in Greek tend to appear bare and indeed tend to express a manner/means component. The ones that appear as complement of v tend to bear verbalizing morphology and indeed tend to involve a ‘state’. This is the case also in English, cf. Harley (to appear).

(53) kov-o          vaf-o          vs.      aspr-iz-o  
cut-1sg          paint-1sg          whit-en-1sg

But, several roots that appear as v modifiers in English contain verbalizing morphology in Greek. This holds also for some manner of motion verbs and most verbs corresponding to ‘manner’ verbs in English:

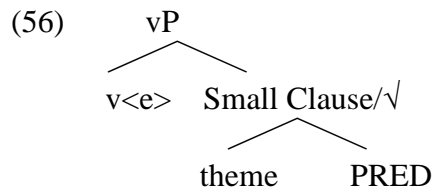
(54) jail-iz-o      skup-iz-o      pot-iz-o      pag-on-o      kil-a-o      strovil-iz-o  
shine-1sg      wipe-sg      water-1sg      freeze-1sg      roll-1sg      spin-1sg

Importantly, Greek licenses resultative secondary predicates only in the context with v modifier (bare) roots, cf. Giannakidou & Merchant (1999):

- (55) a. Vafo tin porta kokkini.  
paint.1sg the door red  
‘I’m painting the door red.’
- b. I kori mou theli na kopsi ta malia tis konda.  
the girl my wants to cut the hairs her short  
‘My daughter wants to cut her hair short.’
- c. Mi potizis ta fita (\*epipeda)!  
neg water.2sg the plants flat  
‘Don’t water the plants (flat)!’
- d. I limni pagose (\*sterei).  
the lake froze solid  
The lake froze solid.



- What does this tell us about the alternations?
- There is a basic structure that is involved in causative semantics:



This comes about in two variants:

1 involving a v complementation structure, e.g. a small clause predicate (as in the case of e.g. de-adjectival verbs; as pointed out in section 3.2, de-adjectival verbs have a more elaborated clause structure, i.e. they are small clauses, cf. Folli & Harley (2005)) or a root (see below).

2 In the context of secondary resultative predication that involves roots directly merging with v, cf. Embick (2004).

Only the latter variant specifies a means component.

Is there a link between **means** and agentivity/ACT? cf. Hale & Keyser (2002).

Generally, v modifiers can participate in the unspecified object alternation and take a non-subcategorized object. In the absence of a small clause predicate they do not involve causative semantics.

According to Schäfer, (56) fits Higginbotham's (2000) notion of <telic pair formation> (cf. Ramchand's 2008a ProcessP-ResultP connection). Specifically,

- **This telic pair is the syntactic source of causative semantics.**

- Causative relations are read off of the complex event structure which relates an unbounded event with a state.

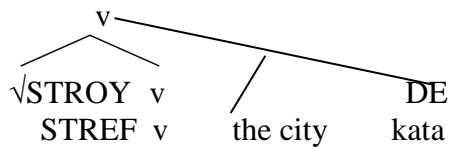
At LF, this tight syntactic relationship between vP and the Small Clause is interpreted as a "leading to"-relation; the truth of <s> depends on the truth of <e>; this is a causative interpretation.

Clearly all verbs of change of state have a structural representation as in (56/51a); Greek shows that even the simple structure, where no small clause is involved yields causative semantics, and independently of the type of root, see (54), (57) with the verb 'kill' in Greek and (58) for 'destroy' (Alexiadou to appear for Greek, cf. Marantz 2001 for English). In English, 'kill' is a v modifier; in Greek it is inserted in the complement of v. The same holds for the other verbs in (54):

(57)           skot-on-o  
              dark-v-1sg  
              'kill'

*Destroy* involves secondary resultative predication (and a manner component):

(58)



- What is the difference between 'external causation' vs. internal causation (presence vs. absence of an external argument, blossom vs. destroy) and the cross-linguistic variation in the participation in the alternation (destroy does not alternate in English but does in Greek)?

Common interpretation/structure: process leading to a change of state (not necessarily telic), expressed in (56).

Both can be modified by causers which name the event/process that leads to the change of state (Alexiadou & Schäfer 2006, Folli & Harley 2007, Pykkänen 2002), licensed in  $v(?)$ .

Only the former is compatible with an Agent/direct causer introduced in Voice.

Again a manner component (in e.g. 58) seems to 'prefer' an Agent, cf. also Erteschik Shir & Rapoport to appear.

If Voice is never required by the root (contra Doron (2003)), in principle it can be freely inserted; then it is simply the case that some constructions would un-interpretable or rather difficult to assign a representation to by the Encyclopedia.

This suggests that the Encyclopedia assigns interpretation to large chunks of structure, as already suggested by examples such as *break the world record*, which do not alternate in English (see Levin & Rappaport Hovav 1995 and AAS 2006) but do in other languages.

Greek can form anticausatives of externally caused 'verbs' as it makes use of a special morphology (non-active) that can prevent the introduction of the external argument, see Doron (2003) and Schäfer (2007).

But this is not possible in the case of agentive 'roots'. Note that cross-linguistically such verbs form a small class, see Levin & Rappaport Hovav (2005) and references therein. Levin (1993) states that e.g. *murder* and *poison* verbs "lexicalize the purpose or manner or instrument of killing". This is clearly so in the case of most Greek *murder/poison* verbs:

- (59) a. *dol-o- fon-o*  
deceit-murder-1sg  
'assassinate/murder'
- b. *pir-o-vol-o*  
fire-throw-1sg  
'shoot'

The above structures make reference to properties that conceptually need to be in control of an Agent, hence the only possible structure that will be interpretable will be the one with Voice (cf. Erteschik-Shir & Rapoport to appear).

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