Uncovering the Scale

On the interaction between the semantics of roots and functional structure

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What constrains the distribution of roots in functional structure (FS)?

Free Distribution Approach (Acquaviva 2014; Borer 2005, Acedo-Matellán & Mateu 2014)

- **ROOTS DISTRIBUTE FREELY; FS DETERMINES MAJOR ASPECTS OF INTERPRETATION**

1. My car has a siren.
2. The fire stations sirened throughout the raid.
3. The factory sirened midday.
4. The police sirened the Porsche to a stop.
5. The police car sirened the daylights out of me. (Based on Borer 2005)

Semantic Interface Approach (Rappaport Hovav & Levin 1998; Harley 2005; Levinson 2007, Levin 2017; Rappaport Hovav 2017)

- **DISTRIBUTION OF ROOTS IN FUNCTIONAL STRUCTURE NONETHELESS CONSTRAINED**

e.g., Freer distribution of manner vs. result roots in FS configurations

Free Distribution Approach

- Roots are grammatically inert: devoid of grammatical or semantic features
- Formal semantic properties of *functional vocabulary* and syntactic structure determine crucial aspects of interpretation
- "…[in] the 'making sense' component: a cognitive place, neither the grammar nor the conceptual system, the [conceptual and grammatical - MRH] outputs are matched**. In the event of a mismatch, the grammar will always prevail**." [Bold, mine]
- "The interpretation [of] the conceptual component …will stretch… within the confines of the concept … so as to match the rigid interpretational constraints circumscribed by the grammar ..." (Borer 2005: 8-9)

Semantic Interface Approach

Certain aspects of the semantics of roots are grammatically relevant and constrain their distribution in functional structure.

Harley 2005, Levinson 2017 : <e,t>, <s_s,t> <s_e,t>

RHL 1998: Semantically richer categorization (*manner, result, instrument…)*

KEY QUESTION: Can we provide a ***principled*** answer to the question of what semantic properties are grammatically relevant?

PROPOSAL: The privileged elements of meaning are **just those that are directly encoded in or directly interact with functional heads of syntax**. Roots and the functional heads share a limited vocabulary which serves to regulate the integration of roots into syntactic structure.

Case study: Sensitivity of FS to semantic content of roots

Degree achievement verbs (DAs)

lengthen, open, narrow, smooth, darken …

Locative verbs represented by *cover* (*cover* verbs)

cover, block, obstruct, surround, coat…

- Verbs in the two classes show subtle contrasts in aspectual potential
- The differences in aspectual potential follow from constraints on the distribution of the two types of roots in FS
- A root-encoded semantic distinction constrains the FS surrounding the two classes of roots

Degree achievements: A standard analysis

6. The crack widened. **[v_{CAUS} [the door √WIDE]]**
7. The workers widened the crack. [The workers Voice **[v_{CAUS} [the crack √WIDE]]]**

(e.g., Alexiadou, Anagnostopoulou & Schäfer 2015; cf. Ramchand 2008)

likewise for many COS verbs – *cool, warm, narrow, soften, harden, thicken, open, empty…* (so far focusing on those derived from adjectives)

- When *v* has a **state-denoting root** as its complement, it contributes **eventivity in the form of an unbounded process leading to the result state**. The structure is interpreted as a causative change of state
- Both transitive and intransitive variants have causative semantics, which is read off the structure (cf. the telic pairs of <e>, <s> Higginbotham 2009; also Ramchand 2008)

Stative readings of DAs

Spatial extent reading

8. The skirt narrows at the bottom. (RH 2014)

Abstract extent reading

9. The plot thickens in chapter three. (DFKG)

Kind reading

10. The trees gradually thin out until there is no longer a canopy above you.[w]

Functional reading

11. The groove between the nose and upper lip flattens with increased exposure to alcohol. (DFKG)

(Sweetser 1997, Gawron 2006, Koontz-Garboden 2010, Deo, Francez & Koontz-Garboden (DFKG) 2013, Rappaport Hovav 2014)

Eventive and stative readings of DAs show parallel aspectual behavior (measure phrases have identical aspectual role)

Open scale without specified measure – only atelic modifier

12. The canyon widened **for/*in two millennia** (eventive)
13. The canyon widens **for/*in ten miles**. (stative)

(*in* – only *begins to widen* reading)

Open scale with specified measure – (only) telic modifier

14. The road narrowed six meters **in ten years/*for ten years** (eventive)
15. The road narrows six meters **in ten miles/*for ten miles**. (stative)

Eventive and stative readings of DAs show parallel aspectual behavior

Closed scale – default telic modifier

16. The tire flattened **in five minutes**. (eventive)
17. The road flattens (out) **in six miles**. (stative)

Restitutive/repetitive ambiguity

18. The crack widened again. (eventive)
19. The road widens again. (stative)
    a. was wide, then not wide and then returned to wide state (restitutive);
    b. road got wider in two places (repetitive) (Koontz-Garboden 2010; DFKG)

Non-eventive readings of of DAs

Basic insight

All uses involve a difference in the degree to which the scalar property denoted by the adjective holds of an entity at two points along an axis in some correlated domain.

-- Temporal axis (prototypical domain)

-- Spatial axis

-- Ordered degrees in some other domain (like exposure to alcohol)

11. The groove between the nose and upper lip flattens with increased exposure to alcohol.

Eventive reading: Change in degree on the temporal axis

Dynamic stative reading: Change in degree on axis in any other domain

(Koontz-Garboden 2010)

The functional structure – building DAs from roots

- The verb is not derived directly from the root, but rather from the *comparative* form of the adjective (Bobalijk 2012: 170)

$$[[[\sqrt{\text{WIDE}}]_A \text{comp}]_A]_V$$

	POS	*CMPR*	*VERB*	
a. English	**good**	**bett**-er	**bett**-er	
b. English	**bad**	**worse**	**wors**-en	
c. German	**gut**	**bess**-er	ver-**bess**-er-n	'good'
d. Russian	**plox**-oj	**xuž**-e	u-**xud**-š-at'	'bad'
e. Finnish	**hyvä**	**pare**-mpi	**para**-ntaa	'good'
f. Georgian	**cud**-i	u-**ar**-es-i	a-u-**ar**-es-ebs	'bad'
g. (Late) Latin	**bon**-us	**mel**-ior	**mel**-iōr-o	'good'

The functional structure – building DAs from roots

The uncategorized root: lexicalizes properties of the scale

√WIDE lexicalizes a positive polarity scale on the dimension of width with no minimal or maximal value

The gradable adjective denotes a measure function (Kennedy 1999, 2007)

[*WIDE*] $_{A}$ is a function from the domain of individuals that have some width to (positive) degrees of on the scale of width at some time

The comparative form of A is a difference function (DF) (Svenonius and Kennedy 2006)

[[*WIDE*] $_{A}$ er$_{comp}$] $_{A}$ provides the difference in (or compares) the result of two different applications of a measure function on the same scale

The functional structure – building DAs from roots

- DAs encode a particular kind of difference function: a **measure of change function (MCF)** (Kennedy & Levin 2008)
  - MCF expresses **the difference in degree to which a scalar property holds of the *same* individual at two time points in the course of an event**
  - **Refinement in light of current discussion**: The MCF measures (or compares) the difference in degree to which a scalar property holds of the same individual at two points along an axis in a correlated domain
  - Comparison of the degree to which a scalar property holds of the *same* individual at two points on some axis is the essence of ***scalar change*** (Kennedy and Levin 2008)

The functional structure – building DAs from roots

PROPOSAL Scalar change in DAs is derived from the comparative form of the adjective by a verbal operator which

- Performs a kind of 'reflexivizing' operation on the difference function of the comparative form, binding the comparandum argument.
- It is effected by a morpheme sometimes realized in Modern English as *–en*, but often with no phonological exponent. I'll call it *compV*.

$$[[[\sqrt{\text{WIDE}}]_{A}\textit{comp}]_{A}\textit{compV}]_{V}$$

The functional structure – building DAs from roots

THE SEMANTIC SIGNATURE OF *COMPV* IS THAT IT DERIVES EVENTIVE AND NON-EVENTIVE (DYNAMIC STATIVE) FLAVORS OF CHANGE

We can consider *compV* a particular variant of *v* and replace v_{cause} which appears in many analyses with v_{comp} (perhaps a variant of *become*)

Non-deadjectival DAs: Lexically encoded *compV*

age, sink, increase, decrease, melt, rise, fall, thaw …

These have the same range of dynamic stative interpretations as deadjectival DA's:

20. Ants increase as you move to the south. (kind)
21. The boiling point of water decreases with altitude. (functional)
22. Near this parish, the cliff sinks to a mere bank.[w] (spatial)

- These verbs have the semantics of *compV* lexically encoded in their roots
- This indicates that functional structure and roots can encode the same content (cf. Beavers & Koontz-Garboden 2020)

$$\sqrt{SINK} \Leftrightarrow / [[\_\_\_\_] _{\sqrt{}}\ compV]_{v}$$

Prediction of the analysis

***CompV* Hypothesis**:

compV can ONLY be affixed to predicates derived from roots with lexically encoded degree (scalar) semantics.

[[[V$\sqrt{\text{ROOT}}_{\textbf{SCALE}}$] $_{A}$comp] $_{A}$ comp*V*] $_{V}$

- Evidence for this hypothesis comes from the analysis of *cover* verbs
- The analysis makes crucial use of **the semantic signature of *CompV***

THE SEMANTIC SIGNATURE OF *COMPV* IS THAT IT DERIVES EVENTIVE AND NON-EVENTIVE (DYNAMIC STATIVE) FLAVORS OF CHANGE

Locative statives – *cover* verbs

cover, *block, obstruct, surround, blanket, shroud, coat*…

23. [The sheet]$_{theme}$ is covering [the statue]$_{location}$

Some claim these verbs are stative causatives (Kratzer 2000, Rothmayr 2009)

24. [$_{VoiceP}$ snow [Voice' [$_{vP}$ v_{CAUSE} [$_{\sqrt{P}}$ √*COVER* [$_{DP}$ the mountains]]]]]

However: (Rappaport Hovav 2018, 2019; Garcia-Pardo 2019; Wilson 2019)

25. a. Snow covers these mountains all year. (stative)

b. The storm covered the mountains with snow. (causative)

Locative stative – *cover* verbs

The stative transitive use is basic and is unaccusative:

26. [voice [*v* [snow √*COVER* the mountains]]]

27. a. Snow covers these mountains all year. (stative)
    b. Snow slowly covered the mountains. (inchoative)
    c. The storm covered the mountains with snow. (causative)

N.B. Despite the fact that the basic verbal variant is stative, *v* in this variant is **NOT** interpreted as an unbounded process leading to a result state, contra analyses cited above.

***Puzzle**: Cover* verbs lack dynamic stative readings

Spatial extent

28. Near the northern tip, the road narrows considerably.
29. Near the northern tip, snow covers the mountains.

    (≠covers more of the mountains)

Kind reading

30. The trees gradually thin out until there is no longer a canopy above you.[w]
31. Moss covers the trees towards the waterfall.

    (≠ more moss, or covers more of the trees)

Functional reading

32. Fish ears grow with increased CO2. (DFKG)
33. Fungus covers the tissue with increased moist conditions.

    (≠ more fungus; ≠ covers more of the tissue.)

***Puzzle**: Cover* verbs lack dynamic stative readings

- Measure phrases with *cover* verbs do not have the aspectual effect that they have with DAs

34. a. The road narrows three feet in two miles. (meaure phrase telicizes)

    b. The snow covers the half the mountain for /*in half a kilometer.
    (specified measure does not telicize)

35. a. The road widens again. (repetitive and restitutive)

    b. Snow covers the road again. (repetitive only).

Non-scalar *cover*

Recall the *CompV* Hypothesis:

The operator *compV* can ONLY be affixed to predicates derived from roots with lexically encoded degree (scalar) semantics.

$$[\,[\,[\sqrt{\text{ROOT}}_{\text{SCALE}}]_{A}\ \text{comp}]_{A}\ \text{comp}V]_{V}$$

- **PROPOSAL:** *CompV* cannot attach to *cover* verbs because they do not lexically encode scalar semantics

  To support this claim we compare:

  cover – non-dynamic stative (lacks scale structure)

  tall – non-dynamic stative core of DA (encodes scale structure)

  Comparison wrt:

  - Measure phrases
  - Comparative constructions

Non-scalar *cover* – measure phrases

- Gradable adjectives can appear with **measure phrases**

36. The table is thirty inches tall.

- In contrast, measure phrases verbs do not sit comfortably on a *cover* verb; they sit best on the direct object:

37. a. Snow covers the mountain *(for) three miles. (cf. John ran for three miles)

    b. Snow covers [three miles of the mountains].

38. *The rug covers the floor three tiles/inches.

39. *The table is three inches covered.

40. a. Three tiles of the floor are covered.

    b. Three inches of the table are covered.

Non-scalar *cover* - comparatives

- Gradable adjectives appear in a range of **comparative XPs**:

41. The table is taller than the desk.
42. The table isn’t as tall as the desk.
43. The table is too tall for the kids to eat on.

- Comparative phrases with *cover* verbs are distinctly odd; best when directly modifying the direct object:

44. ??The red cloth covers the table more than the green cloth. (OK covers [more of the table])
45. ??The red cloth doesn't cover the table as much as the green cloth. (OK as much of the table.)
46. This hat covers your head too much. (OK too much of your head)

Cover verbs: Interim summary

- *Cover* verbs lack a lexically encoded scale;
- *CompV* cannot attach to *cover* verbs;
- Stative uses of *cover* verbs lack the dynamic readings which stative uses of DAs have, since the derivation of the dynamic stative involves comparative semantics, which in turn is dependent on the presence of a scale.

Uncovering the scale in *cover*

However, *cover* verbs appear with adverbials which are classic hallmarks of scalar expressions:

47. The cloth covers the table half-way.
48. The cloth covers the table completely/fully.
49. The cloth covers the table slightly.
50. The cloth covers the table entirely.

These are scalar modifiers which are signal a closed scale.

Uncovering the scale in *cover*

PROPOSAL: the source of the scale with *cover* comes, not from the predicate, but from **the spatial extent of the object**.

This is similar, but not identical, to the way that the spatial extent of the object of an incremental theme (IT) verb provides the scalar source for the predicate: (Rappaport Hovav 2008; Kennedy 2012)

51. I mowed the lawn in three minutes./I wrote the paper in two days.
52. I mowed grass for three minutes./I wrote poetry for two days.

[As with *cover* verbs IT verbs do not appear with measure phrases and comparatives like verbs of scalar change but do appear with scalar modifiers; see e.g., Kennedy 2012]

Uncovering the scale in *cover*

Consider: a 4m long cloth covers a 2m long table. Half the cloth covers the entire table. We describe this situation as in (53), not (54):

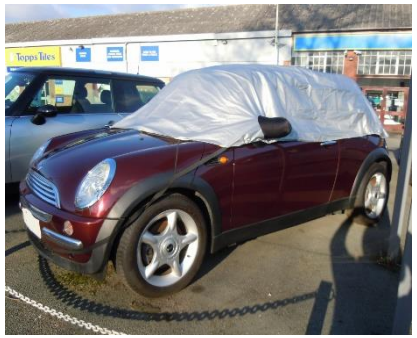
53. The table is fully covered. (not half covered).

54. The cloth half-covers the table. =

    The cloth covers half of the table. ≠

    Half of the cloth covers the table.

A “half-cover” covers half a car.



➢The direct object argument provides the measure or the scale.

Uncovering the scale in *cover*

- The semantics of *cover* and verbs like it: a homomorphism from the measure (i.e. object/location argument) to the other argument such that each portion of the measure argument necessarily corresponds to a portion of the other argument.

55. $\forall x,y\ [\text{cover}(x,y) \leftrightarrow \forall y' <_p y\ [\exists x' <_p x \wedge [\text{cover}^*\ (x',y')]]]$

[*cover** here is shorthand for the specific topological relation holding between the theme and location (measure) argument.]

- The homomorphism will provide the source for the scalar modifiers, despite the fact that cover verbs do not have a lexically encoded scale and do not appear with *CompV*

Two ways of deriving changes of state

HOWEVER: *cover* verbs have eventive COS uses.

56. As the storm developed, snow slowly covered the city

- These **CANNOT** be derived in the same way as the eventive use of DAs since the latter are derived via *compV*.

How *are* the eventive uses of *cover* verbs derived?

- *compV* which derives DAs from gradable adjectives attaches low, in the domain of lexical aspect.

- But the literature recognizes another way of deriving changes of state.

Two ways of deriving changes of state

Many -- perhaps all -- stative verbs in English have inchoative readings, with no addition of morphology. (Smith 1997, among many others)

57. I understand what you are saying. (stative)

58. I gradually understood what people were saying to me. (inchoative)

59. I owned three apartments. (stative)

60. After my Dad died, I suddenly owned three apartments. (inceptive)

- **PROPOSAL**: whatever mechanism is responsible for this general phenomenon is responsible for the eventive COS interpretation of *cover* verbs.

- Changes of state derived this way have only eventive readings, making them different from COS's derived by *compV*, which can be either stative or eventive.

Coming full circle

Free Distribution vs. Semantic Interface Approaches

If we adopt the Free Distribution assumptions (à la Borer 2005):

- that the content of lexical roots is grammatically inert
- that the properties of FS always prevail
- that roots always accommodate the interpretation imposed by FS

We would expect *cover* verbs to be able to 'accommodate' to the semantics of *compV*, and thus allow dynamic stative readings.

The fact that they do not argues strongly that there are elements of meaning encoded in roots which serve as the interface with grammar.

Coming full circle

Semantic Interface Approach:

What are the privileged elements of meaning which constrain the distribution of roots in FS?

- Roots like *√WIDE* and *√COVER* would presumably all be classified as <s_s,t> by Harley and Levinson
- But they interact differently with functional structure
- The differential interaction with FS is attributed to the lexically encoded scales in roots like *√WIDE* but lacking in roots like *√COVER*
- This strongly suggests that scale structure is a grammatically relevant semantic element encoded in roots

Concluding remarks

It is perhaps not surprising that notions such as scale structure and scalar change are grammatically relevant – there are grammatical morphemes which directly encode or interact with such properties.

PROPOSAL:

The privileged components of meaning encoded in roots which are grammatically relevant are just those elements of meaning which are also encoded in or which directly interact with FS. They serve as the interface between the very rich conceptual structure and the very lean grammatical structure.

Thank you!!

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