Substitution Linking and Argument Identification
(Baker and Bobaljik 2002)

1. Argument structure and concatenation

- A basic fact that any theory of morphology must explain is that concatenation can alter the argument structure of a word.
- Since we are treating argument structure as a (complex) feature, and since we've seen that argument structure interacts with concatenation, it is reasonable to ask whether the concatenation operations we have developed so far apply to argument structure features. The answer seems to be: yes!

## 1.1 Argument structure and the Node Labeling Convention (NLC)

- In (1) we see that just as the category of the base *dark* (Adj) differs from that of the derived word *darkness* (N), the argument structure of the base *dark* <th> also differs from that of the derived word *darkness*<R>.
  — The external argument of *dark* is the theme (1a).
  — The external argument of *darkness* is its referent (1b).
  — Note that we cannot use the theme of *dark* as the external argument of *darkness* (this is our evidence for the argument structure change) (1c).

(1) (Bobaljik:unit 4)

					cat.	arg. Struct.
•	I consider	the sky	[(to be) dark].	Dark	Adj	<Th>
•	I consider	that	[(to be) darkness].	Darkness	N	<R>
•	*I consider	the sky	[(to be) darkness].	*darkness	N	<Th>

- We would explain the change in category in (1) by appealing to the NLC. ==We can account for the change in argument structure in the same way, if we introduce the assumption that affixes can have argument structure features as part of their lexical entry.==

(2) WST for *darkness*
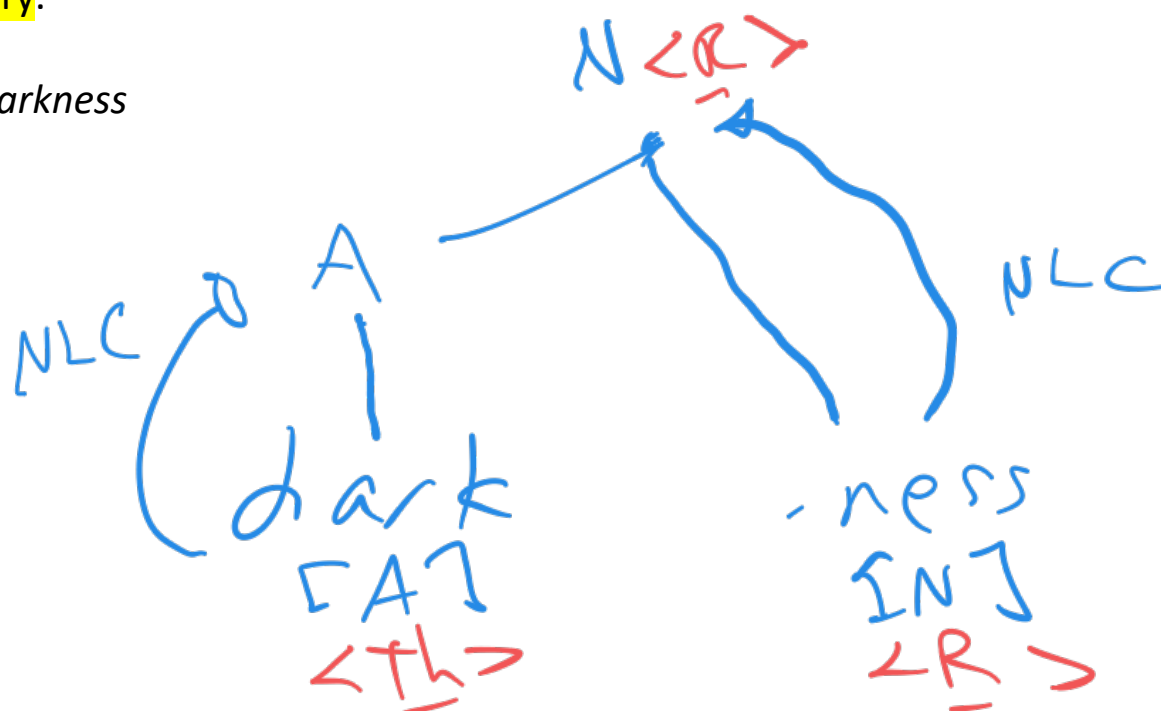
1.2 Argument structure and the Percolation Convention (PC)

- Is argument structure also subject to the PC? Yes!
- Consider the following examples of *re-* prefixation.
— The category of the base is consistently the same as the category of the derived word
— we infer this is an instance of modification and that *re-* does not have appropriate features to trigger the NLC.
— Instead, node labeling happens via the PC.
— This predicts argument structure features should also be transmitted by the PC, which is correct.

(3) (Bobaljik:unit 4)

write	<u>Ag</u> <Th>>	rewrite	<u>Ag</u> <Th>>	I rewrote the handout twice.
inspect	<u>Ag</u> <Th>>	reinspect	<u>Ag</u> <Th>>	They reinspected my car.
Enter	<u>Ag</u>	reenter	<u>Ag</u>	They entered, left, and re-entered.
marry	<u>Ag</u>	remarry	<u>Ag</u>	The couple remarried.
awaken	<u>Th</u>	reawaken	<u>Th</u>	I reawakened shortly before ten.

(4) WSTs for *rewrite* and *re-enter*
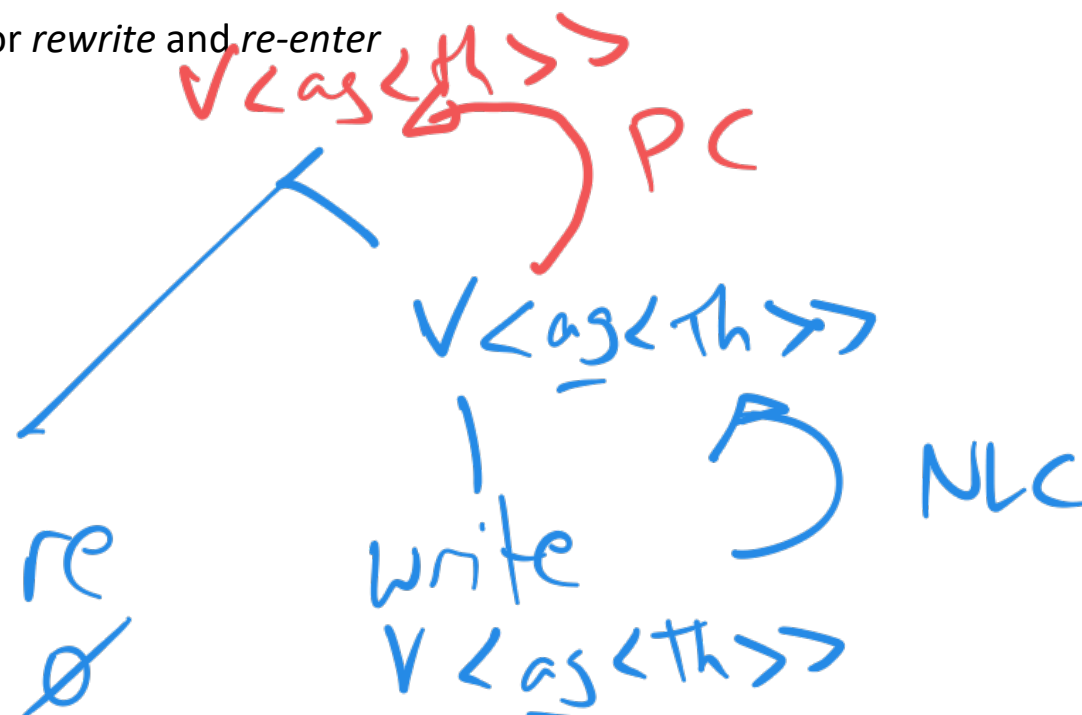
2.3 Argument structure and the HR

- Is argument structure also subject to the HR? Yes!
- In (5) the right-hand member of the compound is the noun, and as per the HR, the compound as a whole is also a noun.
— Likewise, the argument structure of the whole compound is the same as that of its right-hand member.
— We see this is so because we can use the compound in the same syntactic contexts where the noun alone can appear.

(5) (Bobaljik:unit 4)

V+N = N

bridge <u>R</u> <Loc/Go>>	**That** is the bridge over the canal.
drawbridge <u>R</u> <Loc/Go>>	**That** is the drawbridge over the canal.
cloth <<u>R</u>>	I consider **that** [(to be) a nice cloth].
washcloth <<u>R</u>>	I consider **that** [(to be) a nice washcloth].

- Even when the two phrases take the same argument structure (as in many N+N compounds), it is clearly the argument structure of the right-hand member that is applied to the whole.

  — In (6) the referent of the compound *bullfrog* can be the same as the referent of of its righthand member *frog*, but it cannot be the same as the referent of its lefthand member *bull*.

(6) (Bobaljik:unit 4)

N+N = N

bull <<u>R</u>>	<R> refers to bulls.	That is a bull. =True iff "That" = "a bull"
frog <<u>R</u>>	<R> refers to frogs.	That is a frog. =True iff "that" = "a frog"
bullfrog <<u>R</u>>	<R> refers to a type of frog, not a type of bull.	

- These observations are all easily captured if we assume transmission of argument structure via the (Right Hand) Head Rule.

(7) (Bobaljik:unit 4)

2. Beyond the NLC, PC and HR

- We've seen that argument structure features participate in the core operations we have defined so far. However, these operations do not explain the full range of facts involving the transmission of argument structure features.
  — Sometimes the argument structure of a derived word is not the same as either of its components, but rather it is a function of both.

- We are going to introduce operations over argument structure features to account for a fuller range of data.
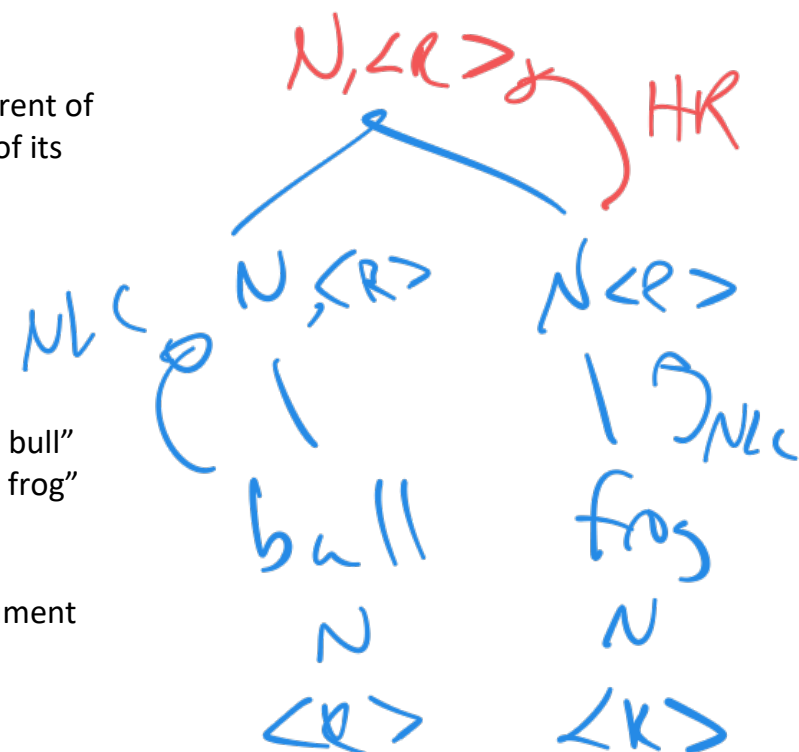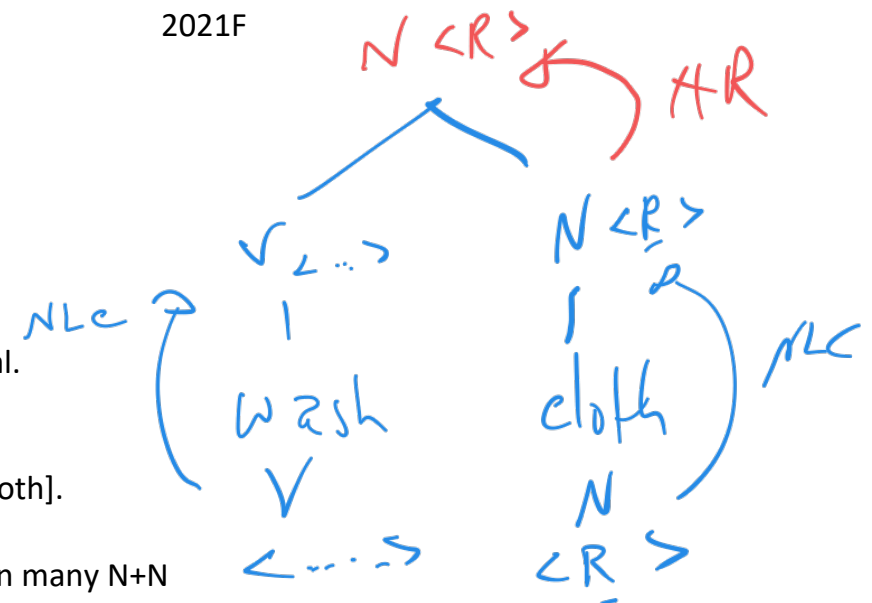
2.1 Substitution linking

- Sometimes the argument structure of the whole is the same as the argument structure of the base **plus** some other argument.

  — For example, the adjective *flat* takes a theme external argument, as in:

  (8) **The metal** is flat

  — Now note that we can derive the verb *flatten* through suffixation of *–en*. The theme argument of *flat* is still part of the argument structure of *flatten* as we can see:

  (9) I flattened **the metal**

  — But now the theme *the metal* is not an external argument, it is an internal argument and a new external argument has been introduced. Where did this new external argument come from? It must have come from the suffix *–en*, which suggests that the NLC has applied. But it the NLC has applied, how have we preserved the theme argument of the base?

  — We need an operation that lets us add a new thematic role without losing the thematic roles introduced by the base
    ➢ **substitution linking**

  (10)   **Substitution Linking:** the argument structure of the non-head *replaces* (or *substitutes* for) an argument of the affix. In this way, it can become a part of the argument structure of the whole word. The argument structures of the two morphemes are said to be *linked*.

  (Bobaljik:unit 4)

• To represent this, we will give an argument structure for *–en* that will serve as a trigger for the substitution linking operation:

  (11)   *-en* <u>ag</u> <ev>>

  — *–en* introduces an agent external argument. Notice its internal argument. The thematic role <ev> stands for 'event' meaning that it introduces an event, but the arguments of this event are unspecified.
  — When we see the <ev> thematic role we know that substitution linking must apply in order to specify the arguments of the event.

- We will show that substitution linking has applied by circling the substituting arguments, drawing an arrow to the <ev> role and labeling this arrow 'substitution linking'.
    — Upon application of the NLC, the argument structure of the top node is reflects the output of the substitution operation: ==the argument structure of the nonhead is written into the internal argument position of the top node==.
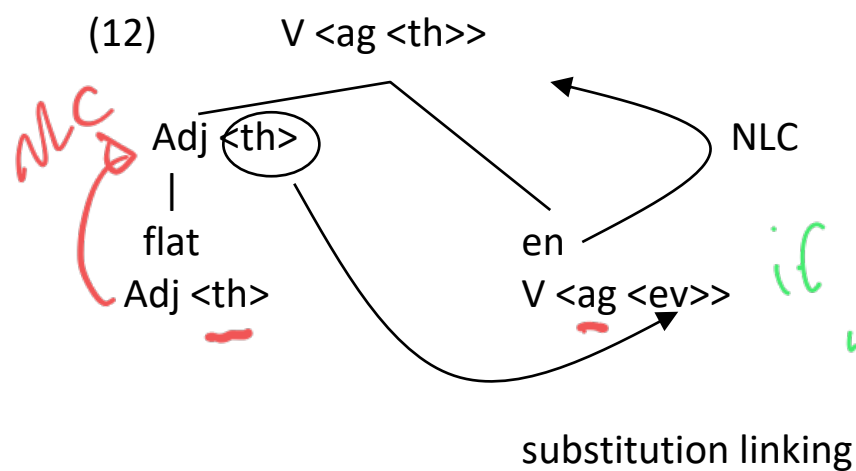
(12)   V <ag <th>>

Adj <th>   NLC

|
flat   en
Adj <th>   V <ag <ev>>

                substitution linking

- Note: there is an important condition on substitution linking:

(13)   **sisterhood condition:** the operation holds between sisters only.

2.2 Argument identification

- Now we will consider synthetic compounds formed with *–ing* nouns. Let's start with some transitive verbs:

(14)   (adapted from Bobaljik:unit 4)
        Some transitive verbs <Ag <Th>>:
        These lions eat meat.
        This machine washes dishes.
        That robot drives trucks.
        <Ag>   <Th>

- The nominalizing suffix *–ing* can attach to verbs to create nouns, so ˆ*-ing* can be category [N]
- Nominalizing -ing introduces an <R> external argument. It also inherits the arguments of its base via substitution linking. We can see this in (15).

(15)   (Bobaljik:unit 4)
   Q: What do you consider our biggest problem?
   A:…
   a.   I consider   it   [(to be) the eating   of meat   by lions].
   b.   I consider   it   [(to be) the washing   of dishes   by machines].
   c.   I consider   it   [(to be) the driving   of trucks   by robots].
                        <R>   <Th>   <Ag>

- Now consider following N-N compounds formed with deverbal *-ing* nouns:

(16)   (adapted from Bobaljik:unit 4)
   a.   One issue   is   meat-eating   (by lions).
   b.   Another issue   is   dish-washing   (by machines).
   c.   A third issue   is   truck-driving   (by robots).
           <R>   <Th>   <Ag>

  −   Observation: In these N-N compounds, the first Noun is clearly being interpreted
      as the <Theme> of the deverbal *-ing* noun.
  −   This is different from all of the examples we have seen so far, where the
      thematic role assigned by a word is satisfied by some other word in the syntax.
          o   The theme role of the verb in (14) is satisfied by the direct object NP
          o   The theme role of the deverbal noun in (15) is satisfied by the
              complement of the *of* PP.
          o   But the theme role of the deverbal noun (16) is satisfied internal to the
              derived word (the compound), not by some other word in the syntax. In
              fact, it would be ungrammatical to try and introduce an independent
              theme in the syntax in these cases (17).

(17)   (adapted from Bobaljik:unit 4)
   a.   One issue   is   meat-eating   (*pork)   (by lions).
   b.   Another issue   is   dish-washing   (*plates)   (by machines).
   c.   A third issue   is   truck-driving   (*fire trucks)   (by robots).
           <R>   <Th>   <Th>   <Ag>

- We will capture the generalization that the left-hand member of the compound
  satisfies a thematic role of the head noun using an operation we will call
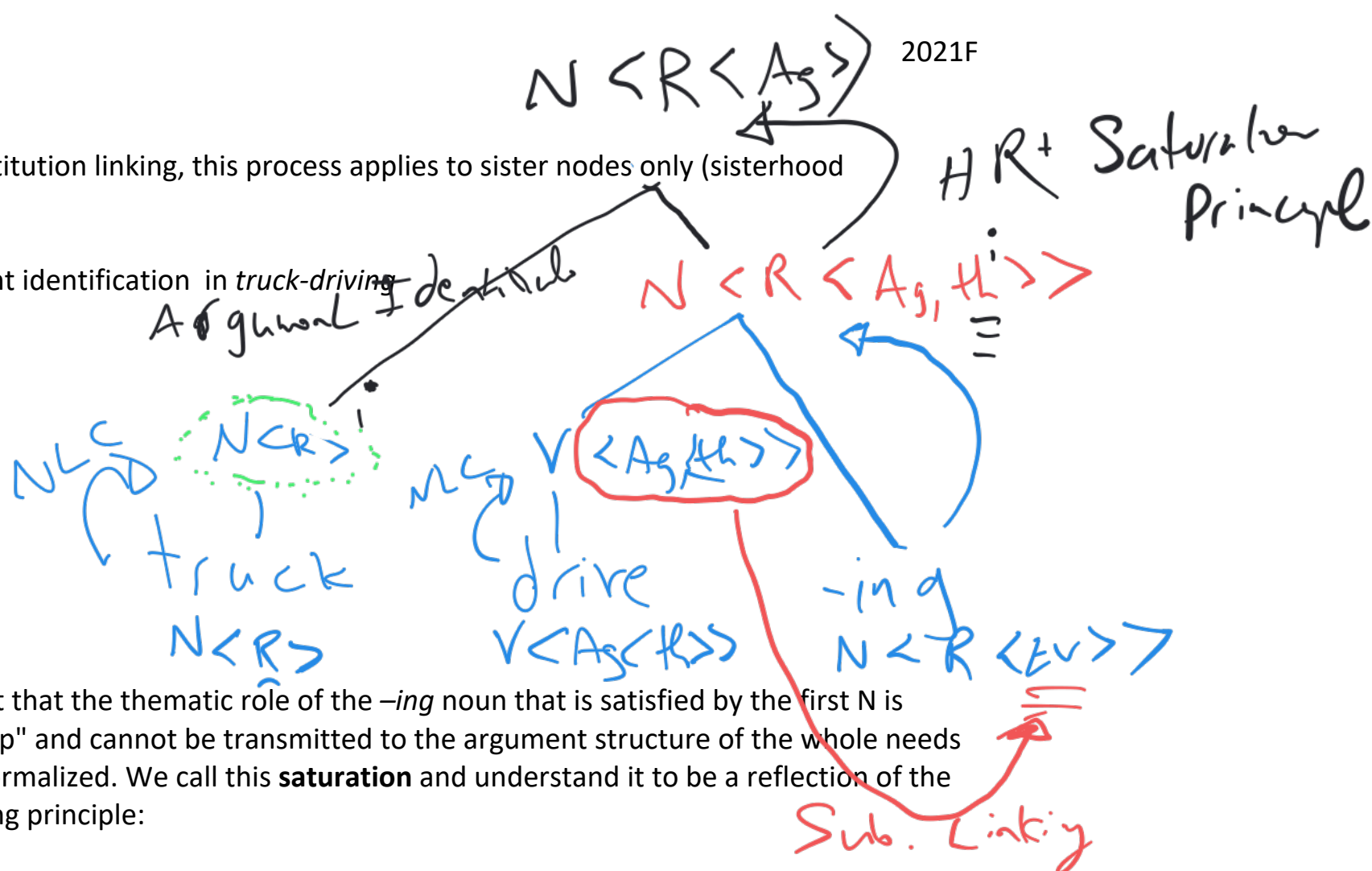 **argument identification**

1) (Bobaljik:unit 4)
   Argument identification: Write a superscript letter (e.g. ^{i}) to the right of the label
   of the node which is identified with an argument of its sister, and a matching
   superscript to the right of the Thematic Role it satisfies.

N ⟨R ⟨Ag⟩⟩   *HR + Saturation Principle*

• Like substitution linking, this process applies to sister nodes only (sisterhood condition).

2) Argument identification in *truck-driving*   *Argument Identification*

N ⟨R ⟨Ag, th'⟩⟩

NLS *N⟨R⟩*   *MC* *V ⟨Ag, th⟩⟩*

truck   *drive*   *-ing*

N ⟨R⟩   *V⟨Ag ⟨th⟩⟩*   *N ⟨R ⟨Ev⟩⟩*

Sub. Linking

- The fact that the thematic role of the *–ing* noun that is satisfied by the first N is "used up" and cannot be transmitted to the argument structure of the whole needs to be formalized. We call this **saturation** and understand it to be a reflection of the following principle:

  (18) **The saturation principle:** If an argument of the head is identified with the non-head via argument identification, then that argument is not passed on to the larger word.

  (adapted from Bobaljik:unit 4)

- The rest of the argument structure is passed up to the top node in the usual way, i.e. via the HR.

3) fully labeled WST for *truck-driving*:

- Note that the unsaturated thematic roles can be satisfied by elements in syntax.

4) a.   Meat-eating [<Ag> by raccoons] isn't supposed to happen.
    b.   Dish-washing [<Ag> by machine] is never quite as good as by hand.
    c.   Truck-driving [<Ag> by robots] should be discouraged