Examples of Workspace (WS) Computation

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Background

[See also file *Introduction to SMT* for motivation and definitions.]

If we assume **Workspace** (**WS**) computation converges, the WS must be initalized correctly with no extraneous items.

First, take the case of **Perception**: suppose you hear and recognize a sequence of words, possibly augmented by expectation.[1] In the WS model, activation of these words in the hearer's lexicon triggers the insertion of appropriate lexical heads. Once the WS is populated with heads, Merge then *auto*-fires, and I-Language structures are built. *Perception* contains a feedback loop on top of (generative) **Thought** (described below). If structures have spell-out compatible with what was heard, they are interpreted by **INT**. A WS may have more than one convergent derivation, e.g. in the well-known case of PP (to VP or NP) attachment ambiguity. Should an alternative structure not spell out what was heard, it will be discarded. This model is how the **SMT parser** operates.

Surface ambiguities, e.g. homonyms, inflectional ambiguities and others, may result in additional computation burden for *Perception*. In the simplest possible model of computation, independent WSs, i.e. parallel and non-interfering (with respect to Merge), should be introduced for each case of ambiguity. (The *SMT parser* treats each thread of WS computation separately.) We assume these kinds of ambiguities are simply not present for generative *Thought*, i.e. just one WS is initiated in the latter case. Suppose a WS contains unused heads or partial, i.e. non-integrated, structures built during *Perception*. In such cases, the language device recognizes the WS as non-convergent; however, other initated WSs may continue (and converge) independently. Should all WSs be non-convergent, the language device deems the input to *Perception* to be *ungrammatical*.[2] (We put aside the possibility that incomplete fragments may still be interpretable.[3])

Next, consider the case of *Thought*: suppose, as concepts are triggered in the mind, appropriate lexical heads will be inserted into the WS. Next, Merge fires, I-Language structures are assembled and optionally **EXT**'ized (i.e. pronounced). We can ask the

[1] In other words, *expectation*, i.e. not actually hearing, could cause WS insertion of heads. In such a model, spoken words cause activation of collocated words retrieved through memory. The *SMT Parser* currently does not deal with these cases.
[2] See note 1. There is an interesting possibility, not explored here, of using expectation for repair, as in "*oh, I thought you said/meant to say* …". This is a natural consequence of the multiple WS model that is independently needed.
[3] For example, completed Phases or θ-configurations could still be read directly by INT. The *SMT Parser* currently does not deal with these cases, only with convergent WSs.

question whether all thought-originated WSs must converge for interpretability. If not, the language device is at best inefficient, incurring wasted computation, and probably should be considered defective. Following SMT, our assumption is that *language organ* is efficient, so no wasted computation in generating thoughts (to be contrasted with the case of *Perception* above). In other words, we assume a "correct" (minimal) set of heads will be inserted into a single WS, and Merge always converges to produce a fine thought. Note Chomsky (2021:10) states:

> *Quite generally, when there is a conflict between computational and communicative efficiency, the latter is always sacrificed, matters discussed elsewhere. To put it metaphorically, when Mother Nature was constructing language, she was concerned with optimal design, not how the system might be used.*

Note that **EXT** is an optional stage, situated downstream from INT. This architectural design has implications. For example, relations computed at INT may affect spellout, as in the case of **M-gaps**. It will also be possible a fine thought will not have a licit spellout in a (given) language. Chomsky (2021:11) states:

> *If that makes expressions harder to process and even makes some thoughts impossible to express without circumlocution, too bad. Nature doesn't care.*

Theta (θ) Configurations

Theta (θ) Theory underpins much of what must be computed directly by Merge. **External Merge** (**EM**) assembles canonical θ-configurations, i.e. universal argument structures, readable by INT.

1. {EA, {v_θ, {R_θ, IA}}}

v always present, but has variants.
head R introduces a θ-position associated with an Internal Argument (IA), marked as R_θ.
head v_θ, introduces the External Argument (EA) θ-position.

INT decodes v properties: can detect the presence (or absence) of EA.
(See also side note later on *theta roles and selection*.)

Efficient computation: only θ-relevant items occupy these IA and EA positions; i.e. **EM** is fully θ-aware and driven (not "free").

In passive/unaccusative θ-configurations, v does not introduce an EA:

2. {v, {R_θ, IA}}

For example, in the structure {XP, {v, {R_θ, IA}}}, XP is not a θ-position.

θ-Merge has different starting points:

WS 1: v_θ R_θ IA EA forms θ-configuration: {EA, {v_θ, {R_θ, IA}}}, or

WS 2: v R_θ IA forms θ-configuration: {v, {R_θ, IA}}

There is no *syntactic* derivational relationship between the two starting (minimal) WSs. In fact, in the case of *Perception*, we may co-initiate both WSs independently in cases of lexical ambiguity. In the case of *Thought*, we assume correct argument structure is always intended, and only one (of the two) WSs will be activated.

Side note on Case and Agreement

A transformational (or derivative) view of active/passive/antipassive voice assumes a core transitive base and can be roughly summarized as follows:

3. ***passive***: IA (change of Case), demote† EA, verbal morphology change
   antipassive: promote‡ EA (change of Case), demote IA, verbal morphology change

   †*demote* here means either express argument as an *adjunct* (in Merge syntax) or be not expressed at all.
   ‡*promote* here means (normally) ergative EA becomes the absolutive EA, and agrees with the verb.

Ergative-absolutive system: verb agrees with IA (not EA) or intransitive EA.
Nominative-accusative system: verb agrees with EA (not IA) or intransitive.

If absolutive is another name for (structural) nominative, verb agrees with nominative universally. Then ergative is an inherent/lexical Case like dative. For example, in an nominative/accusative language, an intransitive verb might have its only argument inherently marked dative.

Following (Chomsky 2021), the language-particular expression of Case is the responsibility of EXT, which is downstream from Merge, and therefore cannot have an effect on Merge computation. We assume the same is true for Agreement, e.g. in Spanish, verbs don't inflect for gender, but nouns and adjectives do. EXT features for Case and Agreement are associated with lexical heads, but they are not visible to Merge. Therefore, such features cannot be part of pre-conditions on Merge, nor can Merge value them (as maximally simple Merge cannot annotate or modify structures (obeying the strongest form of the **NTC**).[4]

Polinsky (*insert cite*) observes that in the antipassive the demoted IA is less affected by the event, e.g. an entailed change-of-state in the IA may be canceled, like with the conative in (4a):

4. a. The marksman shot *at the bear* (*bear*: not affected)
   b. The marksman shot *the bear* (*bear*: affected)

[4] In earlier work, the NTC is sometimes weakened from the strongest possible form. For example, Chomsky has stated that feature valuation does not technically violate the NTC (*cites goes here*).

Demotion in the WS model for passive with adjunct EA headed by P:

WS 2': v R_θ IA P_θ EA (Note v is not v_θ here.)

Narrowly construed, if EA does not participate in θ-Merge, it cannot be present in the WS.

Violates θ-theory:

WS 2'': v R_θ IA EA

Non-convergent WS 2'' never entertained for generative *Thought*, only with *Perception*.

R and P_θ vs. R_θ.[5]

WS 3: v_θ R IA P_θ EA θ-configuration: {EA, {v_θ, {R, {P_θ, IA}}}}

Consider also WS 4 below with v instead of v_θ in the case of the conative passive, as in (5):

5. The bear was shot *at*

WS 4: v R IA P_θ θ-configuration: {v, {R, {P_θ, IA}}}

6. The bear was shot *at* by the hunter

WS 5: v R IA P_θ P'_θ EA θ -configuration: {v, {R, {P_θ, IA}}} & {P'_θ, EA}

Ditransitive: argument-selecting applicative head $appl_\theta$.[6]

7. {EA, {v_θ, {IA_1, {$appl_\theta$, {R_θ, IA_2}}}}}

Argument-selecting set is {v, appl, R}, max 3 arguments,
Later: integration of the *by*-phrase for demoted EA.

Side note on Theta (θ) Roles and Selection

As we have discussed in a previous section, Merge, motivated by the SMT, is maximally simple and INT must be able to decode θ-configurations. In the following configurations, H_θ is an argument-taking head and XP its argument:

8. a. {H_θ, XP} e.g. H_θ = R_θ and P_θ
   b. {XP, {H_θ, ZP}} e.g. H_θ = v_θ and $Appl_\theta$, ZP = RP

[5] Not all transitive verbs admit conative *at*, and speakers' judgments may vary: e.g. *cut*/*nibble*/*shoot*/*kick at*, but not *?carve*/**eat*/**arrow at*. Assume for those whose conceptual lexicon admit the conative, R and P_θ enter the WS as a pair.

[6] In the literature, *add cite*, a distinction is also made between low and high applicatives; i.e. there is the possibility of {IA_1, {R_θ, {$appl_\theta$, IA_2}}} in addition to {IA_1, {$appl_\theta$, {R_θ, IA_2}}} of (7).

We can ask the technical question of how INT knows ZP is not a relevant θ-item in (8b). The answer is that INT (as part of configurational knowledge) knows about *selection*, i.e. v selects for RP, a phrase headed by R. Note that R itself may be an argument-taking head R_θ, e.g. in the case of transitive and unaccusative verbs, or just (plain) R in the case of unergatives or conatives (the latter coded as R-P_θ above). In other words, the presence/absence of θ itself on head R cannot be distinguish between these cases. Therefore, knowledge of selection is necessary for INT to "read", i.e. properly decode, these θ-structures.

Finally, note that Merge does not (and cannot) care about whether a particular role is correctly associated with XP. That task falls to the interpretive component. For example, transitive *drink* takes a θ-relevant IA (*liquid*), as shown in (9a-b).

9. a. drink a beer/some beer/beer[7]
   b. drink a barrel ?(of beer)

Secondary predication in the form of the *resultative dry*$_\theta$ imposes an additional constraint that the IA must also be interpretable as a *container* (as well as a *liquid*), as in (10a-c).

10. a. drink a *barrel* (of beer) *dry*
    b. ??drink a *beer*/some *beer dry*
    c. *drink *beer dry*

Note that the ungrammaticality of (10b-c) is improved when the *container* is adjectivally specified, as in (11a-b).

11. a. drink a large/huge beer *dry*
    b. drink some large/huge beer *dry*

To summarize, θ-Merge does not do θ-role assignment (nor could it due to maximal simplicity). INT must read the I-Language structure computed by Merge and configurationally figure out any semantic constraints that come with the argument-taking heads. (See also discussion of the constraints on *flaw* in examples (18b-c) below.)

The clausal domain

After the completion of θ-Merge, we switch from the propositional domain to the clausal domain by introducing (clausal) heads INFL and C. We assume INFL has ϕ-properties, indicated below as $INFL_\phi$. ϕ triggers a (Minimal) Search for a θ-argument, which may induce verbal Agreement and also be spelled out as a subject at the edge of

[7] *Beer* vs. *wine*: **drink a wine* but *drink some wine/wine*. In my dialect (at least), *drink a beer dry* is marginal, but *drink a wine dry* is sharply ungrammatical.

$INFL_{\phi}$. In the case of English, the subject may be spelled out at the left edge of INFL. Both Agreement and (surface) subject spellout are part of EXT downstream from Merge.

Side note on Minimal Search (MS)

Minimal Search (**MS**) is the only search operation available to I-Language. Search is always targeted, e.g. for a θ-relevant item (or θ-argument). In this account, we assume that search is θ-aware, i.e. it has configurational information that allows it to distinguish between arguments and non-arguments.

Given SMT, search is also *maximally simple and efficient*. It must terminate as soon as the first matching item is found in the c-command domain. Additionally, search may not be resumed, nor should it ever find *equidistant* candidates (and make a comparison between them, selecting one).

In the case of WS 4 above, we obtain clausal configuration (12) with IA marked as IA_{ϕ}:

12. {C, {$INFL_{\phi}$, {v, {R, {P_{θ}, IA_{ϕ}}}}}} ϕ-relation ($INFL_{\phi}$, IA_{ϕ})

(Marking IA_{ϕ} here for notational convenience only, what appears INT is ($INFL_{\phi}$, IA_{ϕ}).)

13. {C, {$INFL_{\phi}$, {EA_{ϕ}, {v_{θ}, {R_{θ}, IA}}}}} ϕ-relation ($INFL_{\phi}$, EA_{ϕ})
14. {C, {$INFL_{\phi}$, {v, {R_{θ}, IA_{ϕ}}}}} (*cf.* (7) *above*)

EXT is subject to (language) variation and exhibits flexibility.

15. a. He_{ϕ} $repairs_{\phi}$ the car (left edge of INFL; EA agreement)
    b. There $have_{\phi}$ arrived $many\ soldiers_{\phi}$ (no spellout; IA agreement)
    c. $Many\ soldiers_{\phi}$ $have_{\phi}$ arrived (left edge of INFL; IA agreement)
    d. We should do this again, $said_{\phi}$ $John_{\phi}$ (right edge of INFL: quotative inversion)

Locative Inversion (LI):

16. a. In the distance $stands_{\phi}$ $a\ mountain\ range_{\phi}$ (LI)
    b. There $stands_{\phi}$ $a\ mountain\ range_{\phi}$ in the distance (no spellout; IA agreement)
    c. $A\ mountain\ range_{\phi}$ $stands_{\phi}$ in the distance (left edge of INFL)
    d. In the distance, there $stands_{\phi}$ $a\ mountain\ range_{\phi}$ (topicalization: cf. (10b))
    e. In the distance, $a\ mountain\ range_{\phi}$ $stands_{\phi}$ (topicalization: cf. (10c))

17. a. {C, {{$INFL_{\phi}$, {v, {R_{θ}, *a mountain range*$_{\phi}$}}}, *in the distance*}}
    b. {TOP, {C, {{$INFL_{\phi}$, {v, {R_{θ}, *a mountain range*$_{\phi}$}}}, *in the distance*}}}

(17b): head TOP searches for an appropriate target, finds the PP, spelling *in the distance* at its left edge, resulting in either (16d) or (16e).
(17a): INFL spellout produces (16b) and (16c). Configurationally, the PP *in the distance* in is already at the edge of INFL. (16a) = spelling the PP at the left edge.

Inject non-argument PP into structure for (16a).

18. a. *{INFL$_\phi$, {v, {{*stand*$_\theta$, *in the distance*}, *a mountain range*$_\phi$}}} (PP lower than IA)
    b. {INFL$_\phi$, {v, {{*stand*$_\theta$, *a mountain range*$_\phi$}, *in the distance*}}} (PP above RP)
    c. {INFL$_\phi$, {{v, {*stand*$_\theta$, *a mountain range*$_\phi$}}, *in the distance*}} (PP above vP)
    d. {{INFL$_\phi$, {{v, {*stand*$_\theta$, *a mountain range*$_\phi$}}}, *in the distance*} (PP edge of INFL)

PP placement at RP and vP shown in (19a-b), respectively.[8]

19. a. {v, {{*stand*$_\theta$, *a mountain range*$_\phi$}, *in the distance*}} = {v, {RP, PP}}
    b. {{v, {*stand*$_\theta$, *a mountain range*$_\phi$}}, *in the distance*} = {vP, PP}

INFL$_\phi$ is targeting a θ-position in vP branch (rather than the PP branch).
(19a): {RP, PP} = **Labeling** conundrum (XP-YP).

(Assume *Pair Merge* can be discarded, simplifying the theory.)

(Chomsky 2021): semantic, i.e. non-stylistic, effects from EXT.

20. a. *There* is *a* flaw in my argument/bottle
    b. *A flaw is in my argument
    c. A flaw is in my bottle

(20a-c) share the following structure and the lexical item *flaw* (=IA):

21. {{INFL$_\phi$, {v, {R, IA$_\phi$}}}, in my argument/bottle}

Relations computed at INT can affect EXT output: *flaw* marked by INT signaling EXT for (20b) only.

Only the highest occurrence of *John* in (22b) is spelled out at EXT.

22. a. John$_1$ wanted John$_2$ to win
    b. {INFL$_\phi$, {John$_\phi$, {v$_\theta$, {R, {~~John~~, {v, win}}}}}}
    c. John wanted to win

In the case of passives, both *there*-insertion and LI are possible:

23. a. He$_\phi$ found$_\phi$ the ancient artifact in this cave (active)
    b. An ancient artifact$_\phi$ was$_\phi$ found in this cave (passive: left edge of INFL)
    c. *There* was$_\phi$ found an ancient artifact$_\phi$ in this cave (passive: pleonastic)
    d. In this cave was$_\phi$ found an ancient artifact$_\phi$ (passive: LI)

[8] Not explored here, but adverb placement could also help diagnose (or disambiguate) PP placement.

24. a. {v, {R_θ, *an ancient artifact*}}
    b. {$INFL_\phi$, {v, {R_θ, *an ancient artifact*$_\phi$}}}}, *in this cave*}

LI is generally not available with transitives:

25. a. *In this cave found he/him the ancient artifact (based on (23a))
    b. {$INFL_\phi$, {EA_ϕ, {v_θ, {R_θ, IA}}}}}, PP}

Case Filter: spelled-out NPs must be Case-marked.

Assume the acquisition mechanism is part of *Perception*.

EXT **maps** (hierarchical) I-Language structure into language-particular sequence of words by recursively "flattening" a phrase at a time:

26. a. {$INFL_\phi$, ...} (INFL, θ-item:EA) ⟼ apply Case, pronounce EA, *recurse* into ...
    b. {EA, {v_θ, RP}} ⟼ EA (never!), *recurse into* {v_θ, RP} on

The simple pattern in (26b) is learnt.
If EA overt, no information on what Case to apply.

Transitive Expletives Constructions (TEC) and *Subject Inversion* (SI):

27. a. Það klaruðu margar mýs *alveg* ostinn Icelandic: (TEC)
    there finished many mice *completely* the-cheese
    'Many mice completely finished the cheese'
    **There many mice completely finished the cheese* (*TEC in English)
    b. Ha letto tutto *bene* Gianni Italian: (SI)
    Has read all *well* Gianni
    'Gianni has read everything well'

EXT (notices and) signals deviations from regular (or *canonical*) word order to the interpretative component; also, with lexical peculiarities.

there-existentials generally signal new information, which interacts with *definiteness*, e.g. (28a-d) in the case of English, and for TEC example (27a) above.

28. a. *there* arose *a*/**the* storm (new/old) (Milsark 1974)
    b. *a*/*the* storm arose (last night)
    c. *a*/*the* policeman is here
    d. *there* is *a*/**the* policeman here

29. a. 老师 来了 Chinese: (Huang 1987) (Wu 2020)
    teacher come.PERF (old)
    '*the* teacher came'
    b. 来了 一个 老师
    come.PERF one.CLF teacher (new) cf. *那个老师 / 'that.CLF teacher"

'*there* came *a* teacher'

Chinese has no expletive *there*; signal is encoded via word order variation.
Spanish: impersonal verb *haber* signals the *there*-existential, as in (30a-c).[9]

30. a. *un* policía está aquí / *hay* *un* policía aquí Spanish: (Tubens, p.c.)
a policeman is here there.is a policeman here
'a policeman is here' / 'there is a policeman here'
b. (**había*) surgió *una* tormenta
there.was arose a storm
'a storm arose'

Language-particular connections of this nature must be explicitly learned.

31. a. {C, {INFL$_{\phi}$, {v$_{PERF}$, {来, 老师}}}}

FormSet Configurations

[See also file *Introduction to SMT* for motivation of FormSet]
See also extensive discussion in FormSet paper (Fong & Oishi, 2025).

Parallelism, with each member of a FormSet structure, treated identically in I-Language is what fundamentally distinguishes FormSet from Merge.

(32a): *resultative*, secondary predication *red*(*wall*).
The θ-relevant item *wall* must be an argument of both predicates *paint* and *red*.

32. a. Peter painted the wall red
b. {Peter, {v$_{\theta}$, {paint$_{\theta}$, wall}}} + {red, wall} (= *red*(*wall*))
c. {Peter, {v$_{\theta}$, {{paint$_{\theta}$, wall}, {red, wall}}}} = {p(wall), p(wall)}
d. {Peter, {{v$_{\theta}$, {paint$_{\theta}$, wall}, {red, wall}}}} = {**v$_{\theta}$P**, p(wall)}
e. *Peter painted the wall red wall
f. {Peter, {v$_{\theta}$, {{paint$_{\theta}$, wall}, {red, ~~wall~~}}}} FormSet { }

(For clarity, colored braces { } are used here to indicate the attachment site.)

Search must be kept as simple as possible.
(32c-d): XP-YP structure.
Call this the **XP-YP search problem** (roughly corresponding to the **Labeling problem** from earlier theory).

Consider merger of a *by*-phrase (for a demoted EA):

33. a. The bear was shot *at* by the hunter

[9] Impersonal *haber* inflects as *hay*/*había*/*habrá* is *there-is/was/will.be*. The verb *haber* (*to have*) is also an auxiliary and main verb.

b. {v, {R, {P_θ, IA}}} + *by*-phrase {P'$_\theta$, EA}
c. {{v, {R, {P_θ, IA}}}, {P'$_\theta$, EA}} = {**vP**, PP}
d. {v, {{R, {P_θ, IA}}, {P'$_\theta$, EA}}} = {**RP**, PP}
e. {v, {R, {{P_θ, IA}, {P'$_\theta$, EA}}}} = {PP, PP}
f. {$INFL_\phi$, {… {v, {R, {P_θ, IA_ϕ}}…{P'$_\theta$, EA}… }} (*schematized*)

Passives: INFL search targets the core θ-configuration, compute ($INFL_\phi$, IA) & pass onto EXT.[10]

(33e) with FormSet-formed (PP-PP parallelism) is ruled out.

Each member of FormSet-structure must be treated identically by search and Merge: parallelism holds both for FormSet formation and use.

34. a. John arrived *and* met Bill
    b. {{v, {arrive$_\theta$, *John*}}, {*John*, {v$_\theta$, {meet$_\theta$, Bill}}}}
    c. {$INFL_\phi$, {{v, {arrive, John$_\phi$}}, {John$_\phi$, {v*, {meet, Bill}}}}} FormSet { }

Puzzle: contrast the inchoative with the passive, as in (35b) vs. (35c):

35. a. John burnt the soup (active)
    b. The soup burnt (inchoative (or anticausative))
    c. The soup was burnt (passive)

(either *burned* or *burnt*, dialectal variation)

36. a. The soup was burnt by John (= sentence)
    b. *The soup burnt by John (≠ sentence, cf. (33b) = sentence)

(36b) is only possible (for me) as an NP, as in (37) and (38b).

37. [The sack of Rome [by the Visigoths] [in 410 AD]] *shocked the empire*

38. a. The soup that was burnt by John smelled terrible
    b. The soup burnt by John smelled terrible (reduced relative)
    c. ?The soup burnt smelled terrible
    d. The burnt soup smelled terrible (adjectival *burnt*)

Each-insertion and Minimal Search (MS)

Consider examples of (so-called) *each*-insertion in (39), taken from (Chomsky 1973).

39. a. The men *each* hated the *other*
    b. *Each* of the men hated the *other*
    c. The men hated *each other*

[10] See also extensive discussion of language-particular spellout rules. We note here, for English, spellout of the core θ-configuration precedes spellout of the non-core *by*-phrase.

Compute relation (*each*, *men*).

40. a. {INFL$_{\phi}$, {*each*, {*men*, {v$_{\theta}$, {hate$_{\theta}$, *other*}}}}}
    b. {INFL$_{\phi}$, {{*each*, {of, *men*}}, {v$_{\theta}$, {hate$_{\theta}$, *other*}}}}

each initiates a (nearest) search in its c-command domain for a relevant θ-item.

other behaves just like the anaphor *each other*.
(Color *green* to indicate when bottom-up (minimal) search will be triggered.)

41. a. *The men hated the *other*
    b. *Neither* of the men hated the *other*
    c. *Neither* man hated the *other*
    d. ?*Neither* man *each* hated the *other*

(41b-c) shows the quantifier *neither* also can be a target of the search.[11]

Raising to matrix object:

42. a. The *candidates* *each* expected the *other* to win
    b. The *candidates* expected *each other* to win

43. a. {INFL$_{\phi}$, {*each*, {*candidates*, {v$_{\theta}$, {*other*, {expect$_{\theta}$, ...}}}}}}
    b. {INFL$_{\phi}$, {*candidates*, {v$_{\theta}$, {*each other*, {expect$_{\theta}$, ...}}}}}

Puzzle: How far can we search?

44. a. The candidates *each* expected to defeat the *other*
    b. The candidates expected to defeat *each other*

45. a. The men *each* expected the soldier to shoot the *other*
    b. *The men expected the soldier to shoot *each other*

46. a. The men *each* saw John's pictures of the *other*
    b. *The men saw John's pictures of *each other*

47. The men *each* believed and expected the sniper to try to target the *other*

(Note in all of the above examples with *each other*, *one another* can be substituted. However, unlike the case of *each*, *one* is inseperable, as in **the men one hated another*.)

[11] Perhaps *either* could also be substituted in (41b-d) for some speakers.