HEAD MOVEMENT

Topics & Goals

- Some instances of HM are scope shifting
- Some instances of HM are limited by the operator scope of other elements
- Head movement provides evidence for object language situation variable

1. WHAT THE DEBATE IS ABOUT

Attempts to eliminate HM:

(1) a. Head displacement is computed at PF (Chomsky 2001; Boeckx & Stjepanovic 2001; a.m.o.)
b. Remnant Movement (RM_1; Hinterhölzl 1997; Koopman & Szabolcsi 2000; Nilsen 2003; Müller 2004, a.m.o.).
c. HM is epiphenomenal (EPI; categorial grammars, Spanning; Brody 2000; Williams 2003; a.m.o.)
[d. Remnant Movement$_2$ (RM_2): just like RM_1 but possibly with changes in definition of c-command or semantic rules of composition]

Motivation for eliminating HM:

(2) a. Axioms of natural language syntax
i. HM fails to observe Extension Condition (but see Lechner 2007; Funakoshi 2014)
ii. HM targets non-c-commanding positions (but see Funakoshi 2014)
b. Symmetry: behavior of HM parallels that of XP-movement.
c. Formal properties: expressive power, complexity, parsability, succinctness or learnability favor RM (cf. Michaelis 2001, 2004, 2009; Stabler 1999, 2003)

(3) Evidence contra RM_2 – ?– evidence contra RM_1 ⊂ evidence contra PF ⊂ evidence contra EPI

Setting aside RM_2, the strongest evidence for orthodox conception of HM comes from interpretation:

(4) *Three types of evidence for orthodoxy from interpretation*

a. *Type I: HM **reacts to** interpretive properties* (contra PF and EPI)
➜ Displacement is the result of synactic movement

b. *Type II: HM **creates** interpretive options (e.g. scope feeding)* (contra RM_1, PF and EPI)
➜ Displacement is not the result of RM_1 or PF movement

c. *Type III: HM **does not disrupt** interpretive properties, e.g. scope* (contra RM_1)
➜ Displacement is not the result of RM_1 (Lechner 2009)

(5) ***SAHM-Conjecture*** (Lechner 2006, 2007)
There are instances of *semantically active head movement.*

(6) An operation O is *semantically active* iff either a or b
a. O is affected by interpretation (i.e. properties of O are co-determined by interpretation)
b. O affects interpretation

(7) Pro SAHM: Vincente (2007); Szabolcsi (2009, 2011); Hartman (2010); Roberts (2010); Funakoshi (2014);Matyiku (2014); Bhatt & Keine (2015); i.a.
Contra SAHM: Hall (2015); McCloskey (2016); Richter & Sailer (2008); a.m.o.

(8) *Outline*
- Some new type II evidence for SAHM (comparatives, coordination)
- Some old type II evidence for SAHM, I (*can*, *need*)
- Type I evidence for SAHM (comparatives)
- HM and scope: against remnant movement analysis of HM

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2. NEW EVIDENCE FOR SAHM

2.1. COMPARATIVES

Universal operators are scope commutative with the degree relation (Heim 2000; Acc_{Deon} is deontic accessibility relation). The raised subject is interpreted within the embedded clause and *require* in V°:

(9) The paper$_2$ is ***required*** [$_{TP}$ t_2 to be exactly 5 pages longer than 10 pages]

a. $\lambda w.\forall w'[Acc_{Deon}(w)(w') \rightarrow \imath d.$the paper is d-long in w' = 15 pages]
'The paper must be no longer than 15 pages.' (*required* ≻ *MORE,* maximum reading)

b. $\lambda w.\imath d.\forall w'[Acc_{Deon}(w)(w') \rightarrow$ the paper is d-long in w'] = 15 pages
'The paper must be at least 15 pages long.' (*MORE* ≻ *required*, minimum reading)

(10) a. [required [[exactly 5 pages MORE than 10 pages] λ_1 [$_{TP}$ <the paper> be d_1-long]]]
b. [[exactly 5 pages MORE than 10 pages] λ_1 [required [$_{TP}$ <the paper> be d_1-long]]]

(11) and (12) only admit the wide scope reading for the modal, they cannot be used to convey (13)b[1]:

(11) Maria ***muss*** genau doppelt so viele Artikel veröffentlichen als Bücher herausgeben
Mary must exactly twice as many articles publish than books edit
"[In order to get promoted], Mary has to publish exactly twice as many articles than she has to edit books."

☞ a. $\lambda w.\forall w'[Acc_{Deon}(w)(w') \rightarrow \imath d.$Mary is publishing d-many articles in w' =
$\imath d.$Mary is editing d-many books in w' × 2]
(□ ≻ *MORE,* maximum reading)

b. $\lambda w.\imath d.\forall w'[Acc_{Deon}(w)(w') \rightarrow$ Mary is publishing d-many articles in w'] =
$\imath d.\forall w'[Acc_{Deon}(w)(w') \rightarrow$ Mary is editing d-many books in w'× 2]
(**MORE* ≻ □, minimum reading)

(12) ?Maria ***muss*** genau doppelt so viele Artikel veröffentlichen als sie Bücher herausgeben ***muss***.
Mary must exactly twice as many articles publish than she books edit must
"Mary has to publish exactly twice as many articles than she has to edit books."

(13) a. *Scenario that verifies □ ≻ MORE only*

	articles published by Mary	*books edited by Mary*
w_1	6	3
w_2	4	2
w_3	12	6

b. *Scenario that verifies MORE ≻ □ only*

	articles published by Mary	*books edited by Mary*
w_1	17 (≈ $\imath d.\forall w'$...)	3
w_2	6	4 (≈ $\imath d.\forall w'$...)

(11) can be parsed into an LF-representation in which the modal is interpreted in its base position:

(14) $[_{TP}\,[_{T'}$ ***must*** $[_{vP}$ [MORE than edit d-many books] $[\lambda_1\,[_{vP}$ Mary publish d_1-many articles]]]]

Generating the wide scope reading for (12) requires covert ATB-movement (contra Bošković & Franks 2000) of the modal, resulting in a SAHM constellation:

(15) [***must***$_2$ [[MORE than t_2 edit d-many books] $[\lambda_1$ [Mary t_2 publish d_1-many articles]]]]

Conclusion: Interaction of modals and MORE elicits evidence in support of SAHM.

NB: An alternative parse, on which the modal is interpreted in both the matrix and the comparative clause and the lower modal is dependent on the higher one also yields a wrong reading, on which the number of articles published would have to be constant across worlds and twice the mininum number of edited books in all deontic alternatives. The problem: MORE combines with a degree, hence *ιd* inevitably scopes over *∀w''*.

(16) $[_{TP}\,[_{T'}$ ***must*** $[_{vP}$ [MORE than λ_2 ***must*** edit d_2-many books] $[\lambda_1\,[_{vP}$ Mary publish d_1-many articles]]]]]

(17) $\lambda w.\forall w'[Acc_{Deon}(w)(w') \rightarrow \iota d.$Mary is publishing d-many articles in w'] =
$\iota d.\forall w''[Acc_{Deon}(w')(w'')$ Mary edited d-many books in w''] × 2

2.2. COORDINATION

Structures to be considered involve an operator (modal, negative predicates) and a coordinator. (Positions in which symbols are interpreted marked by boxes; for fine grained syntactic analysis of similar data see Potter et al. 2017):

(18) operator$_1$ $[[_A$ ... t_1...] coordinator $[_B$ ... t_1...]] (test context for SAHM)

(19) *Diagnostics need to meet two requirements*
a. The structure in which HM has applied must be weaker than (i.e. asymmetrically entailed by) the structure without HM.
b. Conjuncts must be 'large', i.e. include base position of the operator, in order to block (20).

(20) operator $[[_A$ ...] coordinator $[_B$ ...]] (uninformative about SAHM)

Case 1. $\neg(A \wedge B) \equiv \neg A \vee \neg B \neq \neg A \wedge \neg B$, hence existence of $\neg \succ \wedge$ is informative about SAHM.

- *Scenario* that only verifies the wide scope reading of the negative predicate: John refused to do A (i.e. A=1), but not B (B=0). (21)b and (22)b are judged to be true in such models.
- *Size of conjuncts* is controlled by adverbials (*decidedly*, *emphatically* and *evidently, probably,* respectively) that are compatible with matrix predicate (*refuse* and *forget*, respectively) only.

(21) a. $[_A$ Hans ***weigerte***$_1$ sich$_2$ dezitiert seine Zeugnisse einzureichen t_2 t_1] und
H. refused self decidedly his certificates to submit and
$[_B$ er ***weigerte***$_1$ sich$_2$ nachdrücklich eine Prüfung abzulegen t_2 t_1] $(\neg \succ \wedge / \wedge \succ \neg)$
he refused self emphatically an exam to take
"John decidedly refused to submit his certificates and he emphatically refused to take an exam."

☞ b. Hans ***weigerte***$_1$ sich$_2$ $[_A$ dezitiert seine Zeugnisse einzureichen t_2 t_1] und
H. refused self decidedly his certificates submit and
$[_B$ nachdrücklich eine Prüfung abzulegen t_2 t_1] $(\neg \succ \wedge / \wedge \succ \neg)$
emphatically an exam to take

(22) a. Hans ***vergaß*** offensichtlich das Fenster zu schließen und
H. forgot evidently the window to close and
er ***vergaß*** wahrscheinlich auch die Türe zu öffnen. (¬ ≻ ∧ / ∧≻ ¬)
he forgot probably also the door to open
"John evidently forgot to close the window and he probably also forgot to open the door."

☞ b. Hans ***vergaß***$_1$ [$_A$ offensichtlich das Fenster zu schließen t_1] und
H. forgot evidently the window to close and
[$_B$ wahrscheinlich auch die Türe zu öffnen t_1]. (¬ ≻ ∧ / ∧≻ ¬)
probably also the door to open

➜ The modal is interpreted in a derived position.

Case 2. □ (A ∨ B) ⫢ □A ∨ □B, hence existence of □ ≻ ∨ is informative about SAHM. [2]

- *Scenario* which only verifies wide scope reading for modal: A=1 and B=0 in w_1 and A=0 and B=1 in w_2. (23)b is judged to be true in this scenario.
- *Conjunct size* (preliminary): examples in which the verb reconstructs show that conjuncts are large. Isomorphic structures with wide scope verbs arguably also include large conjuncts.

(23) a. Die Kandidaten ***müssen*** ihre Zeugnisse einreichen oder sie ***müssen*** eine Prüfung ablegen.
the candidates must their certificates submit or they must an exam take
"The candidates must submit their certificates submit or they must take an exam."

☞ b. Die Kandidaten ***müssen***$_1$ [$_A$ ihre Zeugnisse einreichen t_1] oder [$_B$ eine Prüfung ablegen t_1]
the candidates must their certificates submit or an exam take
(□ ≻ ∨ / ∨ ≻ □)

Case 3. □ (A ∨ B) ⫢ □A ∨ □B in contexts with *Gapped* modals (Hulsey 2008; Johnson 2003, 2014).

(24) X can be true and Y false, because they are logically independent. (Johnson 2014: (88))

(25) If a modal [...] Gaps alone, then it must scope over the coordination in Gapping. (ibid., (86))

Following Johnson (2003; 2014), Gapping in (26)b/(27)b can be seen as an instance of ATB-V2 and asymmetric subject extraction.

- *Wide scope scenario*: speaker is ignorant whether A or B. (26)b is judged true in this scenario.
- *Conjunct size* is controlled by presence of subject in second conjunct.

(26) a. Hans ***muß*** seine Zeugnisse einreichen oder Maria ***muß*** eine Prüfung ablegen
H. must his certificates submit or M. must an exam take
"John must submit his certificates or Mary must take an exam."

☞ b. Hans$_2$ ***muß***$_1$ [$_A$ t_2 seine Zeugnisse einreichen t_1] oder [$_B$ Maria eine Prüfung ablegen t_1]
H. must his certificates submit or M. an exam take
(□ ≻ ∨ / ??∨ ≻ □)

(27) a. Hans ***kann*** seine Zeugnisse einreichen und Maria ***kann*** eine Prüfung ablegen
H. can his certificates submit and M. can an exam take
"John can submit his certificates and Mary can take an exam." (□ ≻ ∧ / ∧ ≻ □)

☞ b. Hans$_2$ ***kann***$_1$ [$_A$ t_2 seine Zeugnisse einreichen t_1] und [$_B$ Maria eine Prüfung ablegen t_1]
H. kann his certificates submit and M. an exam take

Case 4. □ (A∨$_{excl}$ B) ⫢ □ A ∨$_{excl}$ □ B in contexts with bivalent coordination *either - or*.

- *Wide scope scenario*: A=1 and B=0 in w_1 and A=0 and B=1 in w_2.
- *Conjunct size:* see case 2

(28) a. Die Kandidaten ***müssen*** entweder ihre Zeugnisse einreichen oder
the candidates must either their certificates submit or
sie ***müssen*** eine Prüfung ablegen.
they must an exam take
"The candidates must either submit their certificates or they must take an exam."

☞ b. Die Kandidaten ***müssen***$_1$ [$_A$ entweder ihre Zeugnisse einreichen t_1] oder
the candidates must either their certificates submit or
[$_B$ eine Prüfung ablegen t_1]. ($\Box \succ \vee_{excl}/\vee_{excl} \succ \Box$)
an exam take

Conclusion: Behavior of verbal operators in coordination supports SAHM.

2.3. OBLIAGTORY RECONSTRUCTION

Sometimes the verb obligatorily reconstructs. These contexts are simply uninformative about SAHM.

Case 1. $\neg(A \vee_{excl} B) \neq \neg A \vee_{excl} \neg B$ only admits surface reading $\neg \succ \vee_{excl}$. (29) is judged true in scenarios that verify *narrow* scope only (e.g. door is open (A=0) and window is closed (B=1)), and false in situations that satisfy wide scope only (A=B=1 and A=B=0).

(29) Hans ***vergaß***$_1$ [entweder die Türe zu schließen t_1] [oder das Fenster zu öffnen t_1]
H. forgot either the door to close or the window to open
"John either forgot to close the door or to open the window" ($\neg \succ \vee_{excl}$ / $*\vee_{excl} \succ \neg$)

Case 2. $\neg\neg(A \vee B) \equiv A \vee B \neq \neg(\neg A \vee \neg B) \equiv A \wedge B$: Unavailable wide scope reading verified if the door is open (A=0) and the window is open (B=1).

(30) Hans ***vergaß***$_1$ [weder die Türe zu schließen t_1] [noch das Fenster zu öffnen t_1]
H. forgot neither the door to close nor the window to open
"John neither forgot to close the door nor to open the window" ($\neg \succ$ *nor*/ $*$*nor* $\succ \neg$)

➜ *forget* obligatorily reconstructs; orthogonal to argument about SAHM

Case 3. *forget* systematically takes narrow scope also in other contexts, e.g. $\neg \succ \forall \neq \forall \succ \neg$. Scenario that verifies wide scope reading only: two out of four times John forgot to close the windows:

(31) a. Hans ***vergaß*** immer die Fenster zu schliessen. ($*\neg \succ \forall / \forall \succ \neg$)
b. Hans vergaß jedes Mal, die Fenster zu schliessen ($*\neg \succ \forall / \forall \succ \neg$)

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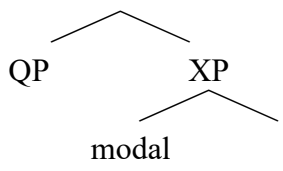
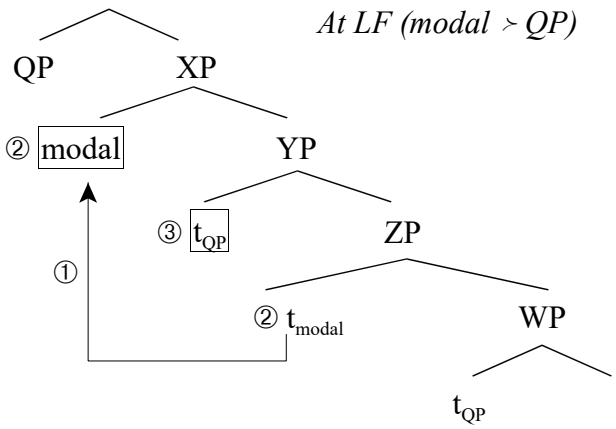
3. OLD EVIDENCE FOR SAHM I (*CAN*)

Diagnostic: Contexts in which narrow scope of modal across quantifier yields weaker readings.

(32) a. *In overt syntax*



b. *At LF (modal ≻ QP)*



(33) *Components of the argument*
① (At least some) modals are base-generated low and move
② Compositional semantics for HM-chains
③ QP in (32) is interpreted *above* the base position of the modal
➜ The modal is interpreted in a derived positions in scope order *modal* ≻ *QP*

Objective: To defend SAHM argument in Lechner (2007) against Hall (2015) and McClosley (2016).
- Main contention by Hall and McClosley: ③ is derived from an incorrect generalization
- Reply: the crucial contexts do not fall under this generalization. Both authors fail to see that ③ is in fact secured by independent means.

3.1. MODALS MOVE

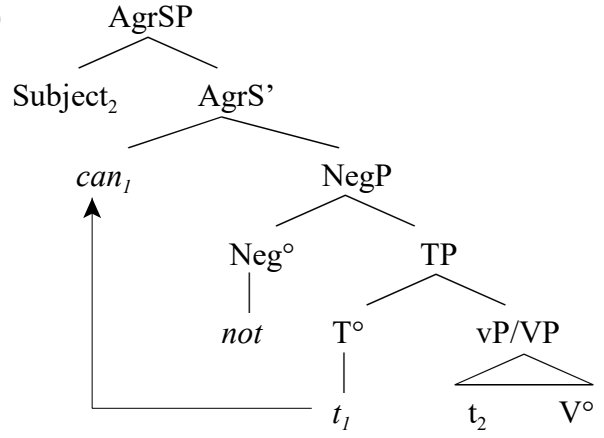
Modals move and reconstruct: circumstantial modals display strong preference for narrow scope w.r.t. negation (Lerner & Sternefeld 1984; Öhlschläger 1989; Iatridou and Zeijlstra 2013; Fintel & Iatridou 2004a/b):[3]

(34) John ***can***$_3$ *not* t_3 come along today (¬ ≻ ◇ /??◇ ≻ ¬)

(35) He ***can***$_3$ *always* t_3 count on me (*always* ≻ ◇/*◇ ≻ *always*)

(36) He ***can***$_3$ *never* t_3 do that (*never* ≻ ◇/*◇ ≻ *never*)

(37)



NB: The observation that some modals obligatorily reconstruct is orthogonal. In order to establish that modals move, it is sufficient to show that they *can* reconstruct. (This replies to a point in Hall 2015.)

[Intermediate movement step to Neg° not represented]

(38) *Neg-shift hypothesis*: Inverse scope is the product of covert movement of the negation across the modal (henceforth *Neg-Shift*).

Testing (38): In (39), the PPI *sometimes* must not be construed within the scope of negation (judged to be marginal by some informants; Hall 2015, 122, fn. 20 consulted in)

(39) It *can* sometimes *not* be avoided to confront the enemy. (*sometimes* ≻ ¬ ◇)

The inverted scope order can either be attributed to reconstruction of the modal ((40)), or to covert Neg-Shift followed by covert movement of the PPI *sometimes* ((41)):

(40) ☞ *Derivation A: modal reconstruction*
a. $[_{AgrSP}$ it ***can***$_1$ [sometimes $[_{NegP}$ *not* $[_{TP}$ **t$_1$** *Surface order*
b. [sometimes $[_{NegP}$ *not* $[_{TP}$ **can** *Reconstruction of* can

(41) *Derivation B: Neg-Shift and modal base-generated*
a. $[_{AgrSP}$ it ***can*** [sometimes $[_{NegP}$ *not* $[_{TP}$ *Surface order*
b. $[_{XP}$ *not*$_2$ $[_{AgrSP}$ it ***can*** [sometimes $[_{NegP}$ t_2 $[_{TP}$ *Covert Neg-Shift*
c. $[_{YP}$ sometimes$_3$ $[_{XP}$ *not*$_2$ $[_{AgrSP}$ it ***can*** [t$_3$ $[_{NegP}$ t_2 $[_{TP}$ *Covert movement of* sometimes

Argument 1 against Neg-Shift: Szabolcsi (2002) notes that weak indefinite PPIs (*somewhat* in (42)) cannot satisfy two conflicting requirements (PPI: wide scope; weak indefinite: narrow scope).

(42) *John *doesn't* appreciate this ***somewhat*** somewhat *can't outscope negation*

Sometimes behaves like *somewhat:*

(43) *John *didn't* ***sometimes*** come to class sometimes *can't outscope negation*

Sometimes does not covertly move across negation in (43). Thus, it cannot do so in (39), either.

➜ (39) derives from reconstruction of modal ((40)) and not Neg-Shift and PPI-movement ((41)).

Argument 2 against Neg-Shift: While regular PPI's (*some NP*) may escape clausal negation, for many speakers these PPI's cannot move across negative subjects. This can be expressed as in (45):

(44) a. John didn't buy some book
b. ??Nobody bought some book.

(45) *PPI Generalization*
PPIs cannot covertly cross over the subject position (for present purposes: AgrSP).

The negative subject effect is even more pronounced with the PPI *sometimes*:

(46) a. Nobody can always win
b. *Nobody can sometimes win

The Neg-Shift derivation (41) locates the LF position of the adverbial PPI *sometimes* to the left of the subject, contradicting the PPI-Generalization (45):

(47) $[_{YP}$ *sometimes*$_3$ $[_{XP}$ not$_2$ $[_{AgrSP}$ ☛ *it* can$_1$ $[t_3$ $[_{NegP}$ t_2 $[_{TP}$ t_1 ....]]]]]] (= (41)c)

➜ (39) derives from reconstruction of modal ((40)) and not Neg-Shift and PPI-movement ((41)).

3.2. Scope Splitting

Scope splitting: dissociation of the surface position and the semantic scope of negation. Many cases of splitting involve negative quantifiers and modals (Bech 1954/57: §80; Kratzer 1989; Penka 2002; Heim 2000; de Swart 2000; Zeijlstra 2007; a.m.o).

(48) a. ***No Irish$_{SUB}$ need*** apply. (¬□ ≻ ∃)
'It is not necessary that Irish apply' (from Fintel & Iatridou 2004a)
b. No references have to be supplied. (¬□ ≻ ∃)
c. No deposit is required. (¬□ ≻ ∃) (Irene Heim)
d. Sam can find no solution. (¬◇ ≻ ∃) (Johnson 2001)

Negative indefinites may also be assigned wide scope *de re* reading, which is characterized by weak t-conditions, though (de Swart 2000; Penka & Stechow 1999; (49)b from Penka 2002):

(49) a. ⟦**No Irish VP**⟧ = (¬∃ ≻ □)
b. = ¬∃x[Irish(x) ∧ ⟦**VP**⟧(x)] = True if '∃x[Irish(x)]' is false, i.e. if there are no Irish

Analysis: Scope splitting is an instance of NPI licensing. Negation is overtly morphologically marked on the negative quantifier, but interpreted in a higher position (NegP; von Stechow 1992/93; Penka 2002,

2010; Penka and von Stechow 2001; Zeijlstra 2004; Zeijlstra & Penka 2005):

(50) a. Sam $[_{XP}\ X°_{\textbf{[+neg]}}\ [_{YP}$ can $[_{VP}$ find $[_{DP}$ no solution$]_{\textbf{[+neg]}}]]]$
b. Sam$_2$ $[_{XP}$ not $[_{YP}$ can [no solution$_1$ [find$(t_1)(t_2)$]]]] $(\neg\Diamond \succ \exists)$
c. $\lambda w.\neg\exists w'\exists x[\text{Acc}(w)(w') \wedge \text{solution}(x)(w') \wedge \text{find}(x)(\text{John})(w')]$

(51) a. Syntax: Negative NPs bear [+neg] that must be in scope of clause-mate NOT at LF.
b. Semantics: $[\![\textbf{[No NP]}_{[+neg]}]\!] = [\![\textbf{NP}]\!]$
$[\![\textbf{[Not every NP]}_{[+neg]}]\!] = [\![\textbf{[every NP]}]\!]$

(52) a. LF: $[_{AgrSP}\ \text{Subject}_{PF}\ [_{NegP}\ \text{NOT}\ [_{TP}\ t_{subject}\ [\text{NP}_{[+Neg]}\ ...]]]]$
b. LF: *[☛$\text{NP}_{[+Neg]}$ .. $[_{AgrSP}\ \text{Subject}_{PF}\ [_{NegP}\ \text{NOT}\ [_{TP}\ t_{subject}\ [...\ ]]]]]$

3.3. SPLIT READINGS WITH NEGATED UNIVERSALS: SAHM

Negated universals also have split readings. The universal can be interpreted *de dicto* w.r.t. the modal, while the modal is read within the scope of negation:

(53) ***Not everybody can*** be an orphan. $(\neg\Diamond \succ \forall)$ (André Gide)
'It is not possible that everybody is an orphan'

(54) Not every pearl can be above average size. $(\neg\Diamond \succ \forall)$
'It is not possible that every pearl is above average size'

(55) Not every boy can make the team. $(\neg\Diamond \succ \forall)$
'It is not possible that every boy is on the team'

3.3.1. Logical independence

The split reading $\neg\Diamond \succ \forall$ can be truth conditionally distinguished from the surface scope *de re* interpretation $\neg\forall \succ \Diamond$. Consider the following example:

(56) Not every lottery number can be drawn.

a. $\lambda w.\neg\forall x[\text{lottery\_number}(x)(w) \rightarrow \exists w'[\text{Acc}(w)(w') \wedge \text{be\_drawn}(w')]]$ (*de re*)
b. $\lambda w.\neg\exists w'\forall x[[\text{Acc}(w)(w') \wedge \text{lottery\_number}(x)(w')] \rightarrow \text{be\_drawn}(w')]$ (split *de dicto*)

de re reading: The *de re* interpretation (56)a conveys that only a proper subset of all possible lottery numbers can ever be lucky numbers; could e.g. be used to relate finding that a lottery is rigged and that 7 is never a winning number. The split reading (56)b, on which the universal is interpreted *de dicto*, entails that the winning numbers are a proper subset of all lottery numbers.

split reading: Model (57) verifies split reading (56)b (there is no world in which all lottery numbers are lucky ones) but fails to satisfy *de re* interpretation (56)a (each lottery number in w_0 is a lucky number in one world):

(57) *Model which satisfies split* de dicto *reading (56)b, but not* de re *reading (56)a:*

	a	b	c
w_0	●	○	○
w_1	○	●	○
w_2	○	○	●

For any $x \in D_e$ and $w \in D_w$,
○ $=_{def}$ *x is a lottery number in w*
● $=_{def}$ *x is a lottery number in w and x is drawn at the lottery in w*

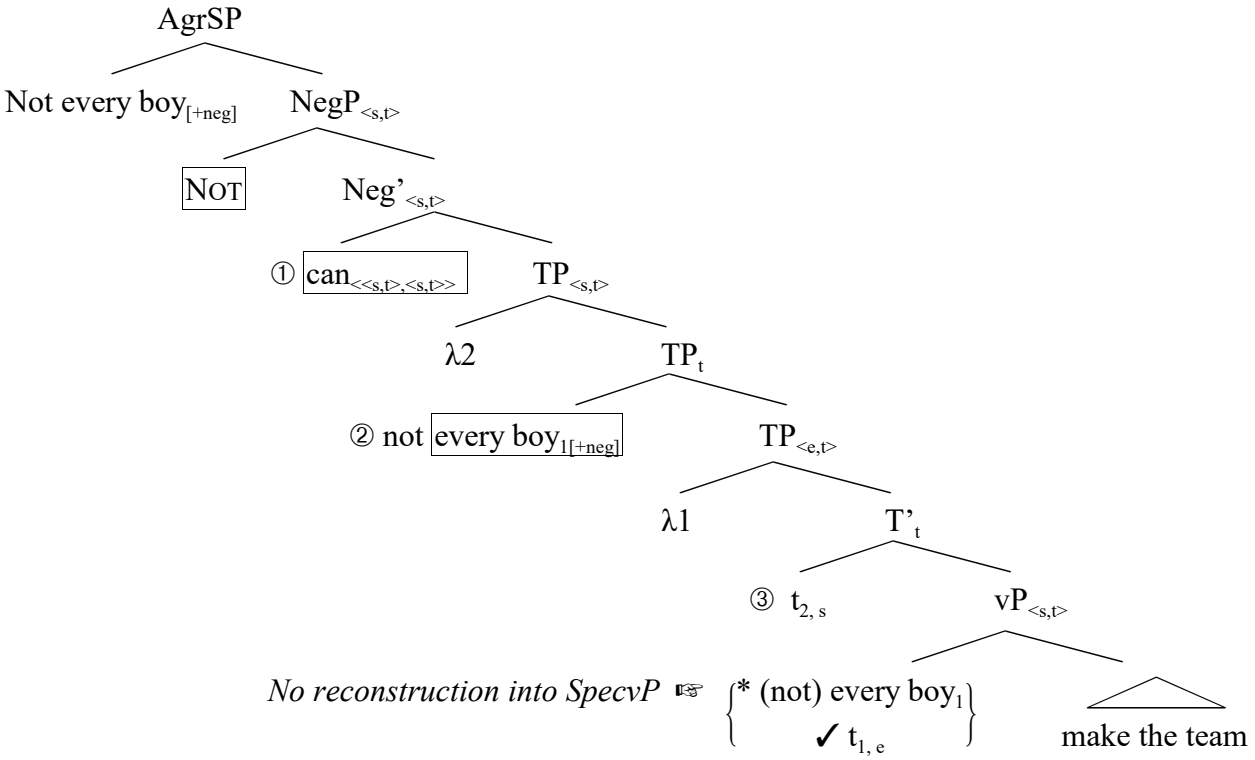
The evidence for SAHM is based on the *circumstantial* reading of *can* (as opposed to *dispositional* interpretation, which has properties of a control structure).

(58) a. Sally can come along (because the car fits five) *Circumstantial* (<st,st>)
b. Sally can swim *Dispositional* (<<e,st>,<e,st>>)

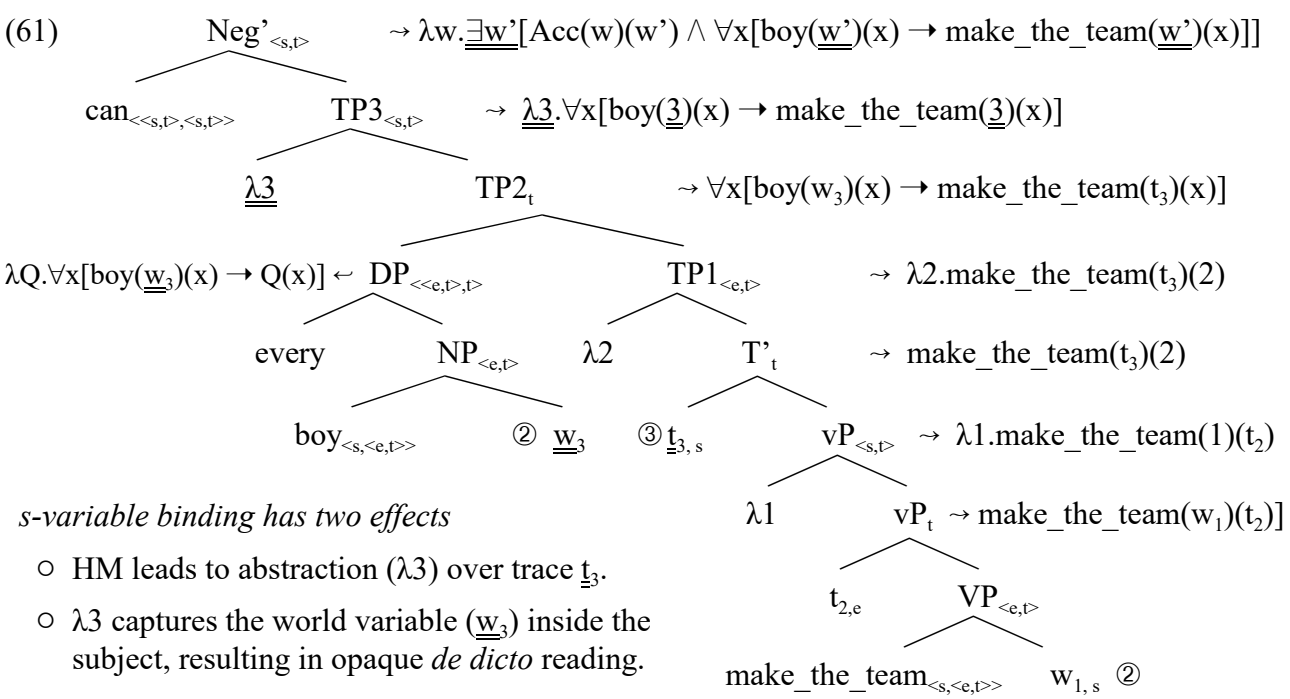
Analysis of split reading of *Not every boy can make the team* generates an argument for SAHM:

(59) *Syntax*
① The modal *can* overtly raises from T° to Neg° to AgrS°.
② *not every boy* bears [+neg]-feature and must be in the scope of abstract negation NOT
③ *(not) every boy* cannot reconstruct below T° (☞ see subsection 3.4. for details)

(60) Not every boy can make the team (¬ ≻ ◊ ≻ ∀)



(61)



s-variable binding has two effects

- HM leads to abstraction (λ3) over trace $\underline{t}_3$.
- λ3 captures the world variable ($\underline{w}_3$) inside the subject, resulting in opaque *de dicto* reading.

(62) *Semantics*
① World variables are explicitly represented as silent pronouns in the object language.
② Predicates enter the derivation supplied with empty world arguments (Percus 2000).
③ Movement of modal leaves a trace of type s (domain of worlds/events/situations)

Next: Evidence that the subject of (60) is interpreted *above* the base position of the modal.

3.4. THE LF POSITION OF THE SUBJECT

Evidence for the assumption that subject of (60) is not interpreted below the base position of the modal falls out from the interaction of scope splitting and NPI-licensing. The argument has three ingredients.

Ingredient 1. The *Immediate Scope Constraint* (Linebarger 1980) demands that the licensing relation between an NPI and negation is not disrupted by a strong quantifier:

(63) a. He *didn't* like *anything* (Linebarger 1987)
b. *He *didn't* **always** like *anything* (* ¬ ≻ ∀ ≻ NPI)

(64) a. I *didn't* want her to eat any cheese (Linebarger 1980: 29)
b. *I *didn't* want **every boy** to eat *any cheese* (* ¬ ≻ ∀ ≻ NPI)

Negated universals license NPIs:

(65) Not everyone who works on negation has *ever* read any Jespersen (Horn 2000: (49b))

NPIs and scope splitting are not in principle mutually exclusive:

(66) a. *Noone* can *ever* be on this team. (¬ ≻ NPI ≻ ◇ ≻ ∃)
b. *Noone* can *ever* be sure whether Homer was just one person.

NPIs are not licensed by negative universals:

(67) **Not* ***everyone***$_1$ can *ever* t_1 be on the team.

Observation: The contrast (66) vs. (67) is due to the Immediate Scope Constraint. (67) is ill-formed for the same reason that (68) is - in both cases, a strong DP intervenes between the NPI and negation:

(68) *It is *not* possible that **everybody** will *ever* be on the team. (¬ ≻ ◇ ≻ ∀ ≻ NPI)

(69) It is *not* possible that **you/a dog** will *ever* be on the team. (¬ ≻ ◇ ≻ NPI)

Conclusion: The universal part of *not every* serves as an intervener between NOT and NPIs.

Ingredient 2 (locating 'ever'). *Ever* and *always* are aspectual modifiers. If they cooccur, *ever* needs to precedee *always* (again, due to the Immediate Scope Constraint).

(70) a. *No* one source is *ever* **always** authoritative.
b. **No* one source is **always** *ever* authoritative.

In (35), repeated from above, *always* scopes above the modal to its left. Thus, *always* originates as an adjunct to the node containing the base position but excludes the derived position of the modal (TP):

(35) $[_{AgrSP}$ He$_2$ $[_{AgrS'}$ can$_1$ $[_{TP}$ **always** $[_{TP}$ t_2 $[_{T'}$ t_1 count on me]]]]] (*always* ≻ ◇/??◇ ≻ *always*)

Given (35) and the order restriction (70), *ever* must be parsed at least as high as an TP-adjunct:

(71) a. *ever* precedes *always*
b. *always* is a TP-adjunct (or an adjunct to a higher node, such as NegP)
➜ c. ∴ *ever* is adjoined to TP or above

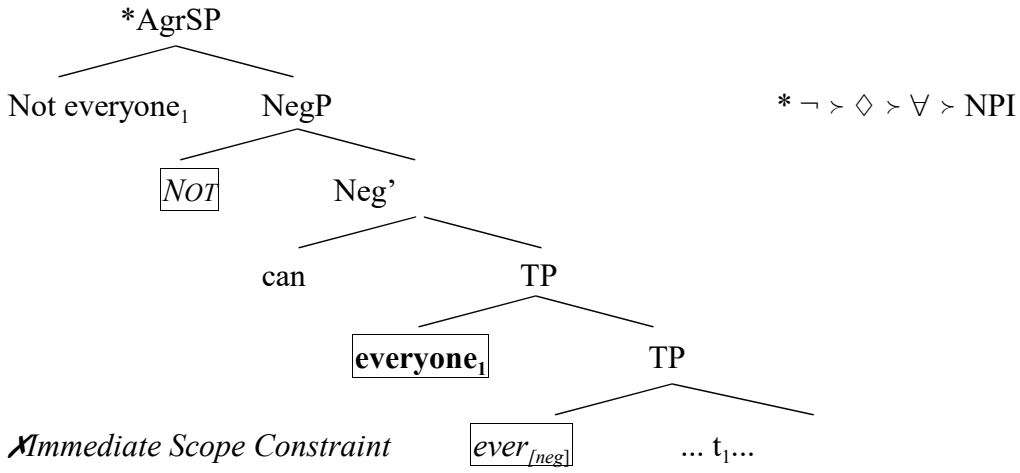
Ingredient 3 (locating the subject). Combining the above yields a criterion for LF-position of subjects:

(72) *Triangulating the subject*
a. If at LF, the subject is above *ever,* it is located *above* TP.
b. If at LF, the subject is lower than *ever,* it is located *below* TP.

(67) **Not* **everyone** can *ever* t be on the team

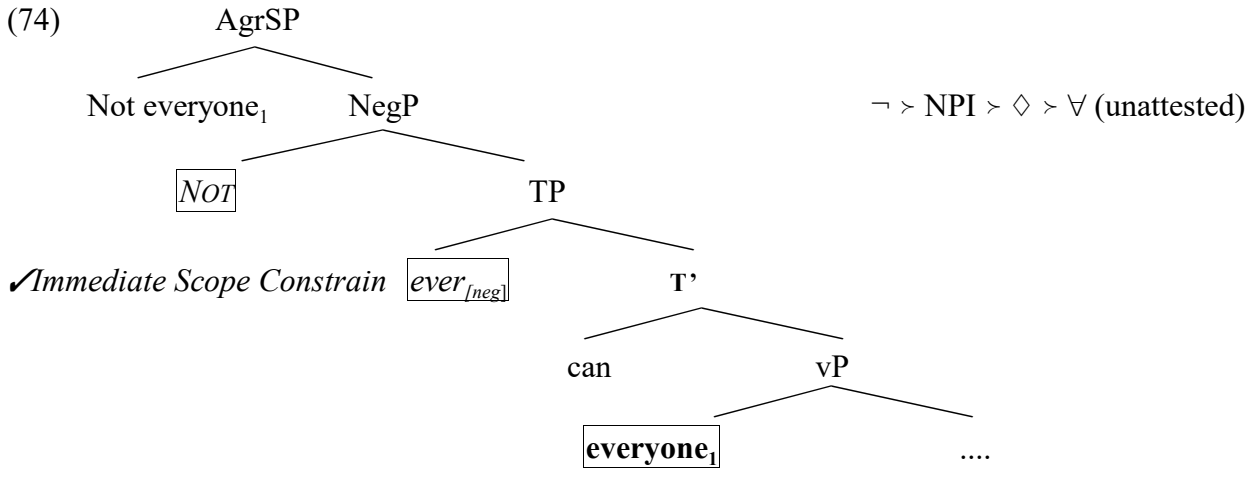
Parse A. Suppose the subject is located above *ever* at LF. Then, it becomes possible to exclude (67) as a violation of the Immediate Scope Constraint.

(73)



Parse B. If, alternatively, the subject is interpreted below *ever* and the base of the modal, (74) is a possible representation for (67). Thus, (67) is incorrectly predicted to be well-formed.

(74)



➜ Only (73) is a possible representation for (67). The subject cannot be interpreted below T°.

(75) ***An argument for SAHM***
a. T° is the base position of the raising modal *can*.
b. The subject in (60) (***every boy***) is interpreted *above* the base position of the modal (t_3).
➜ c. ∴ The modal must be interpreted in a derived position, in support of **SAHM**.

(60) Not every boy can make the team ($\neg \succ \Diamond \succ \forall$)

a. Overt: Not every boy$_2$ [$_{NegP}$ NOT can$_3$ [$_{TP}$ $t_{2,\ subject}$ [$_{T'}$ $t_{3,\ modal}$ [$_{vP}$ $t_{2,\ subject}$ m.t.t.]]]]

b. LF: [$_{NegP}$ NOT [$_{Neg°}$ can$_3$] [$_{TP}$ every boy$_2$] [$_{T'}$ $t_{3,\ modal}$ [$_{vP}$ t_2 m.t.t.]]]]

Comparatives again: Minimal variants of (9), in which the raising predicate *required* is substituted by a modal, also instantiate SAHM. On maximum reading, modal is interpreted in derived position:

(76) The paper ***must*** be exactly 5 pages longer than 10 pages.

a. $\lambda w.\forall w'[Acc_{Deon}(w)(w') \rightarrow \imath d.$the paper is d-long in w' = 15 pages]
'The paper must be no longer than 15 pages.' (*must* $\succ$ *MORE,* maximum reading)

b. $\lambda w.\imath d.\forall w'[Acc_{Deon}(w)(w') \rightarrow$ the paper is d-long in w'] = 15 pages
'The paper must be at least 15 pages long.' (*MORE* $\succ$ *must,* minimum reading)

(77) a. [must [[exactly 5 pages MORE than 10 pages] λ_1 the paper be d_1-long]]

b. [[exactly 5 pages MORE than 10 pages] λ_1 [required the paper be d_1-long]]

3.5. RESPONSE TO HALL (2015) & MCCLOSKEY (2016)

Hall (2015) raises two main objections to the argument outlined in §3.4 above.

Objection 1. *Subject reconstruction* ***is*** *possible after all*. Some split scope orders can also be derived by subject reconstruction, instead of modal movement. For (78), this is the only option, as Hall notes.

(78) [Not every book about ***him***$_1$]$_2$ can appear to each ***footballer***$_1$ t_2 to be well written ($\neg \succ \Diamond \succ \forall$)

(79) "Given that it appears that (at least in the case of strongly quantified NegDPs) reconstruction below T must be available, Lechner's invocation of head movement as the sole possible explanation for the split scope reading is no longer feasible." (Hall 2015: 133)

Response: Yes, (78) indeed involves subject reconstruction - but this is immaterial because (78) is a bi-clausal raising structure which includes additional lower reconstruction sites for the subject *below* the base position of the modal. Relevant examples for SAHM are all mono-clausal.

Objection 2. *The 'Strong Constraint'*. Hall correctly points out that the Strong Constraint undergenerates (Iatridou and Sichel 2011; McCloskey 2016)

(80) *Strong Constraint* (Lechner 2007: (19))
Strong NPs cannot reconstruct below T°.

McCloskey (2016) claims that "the argument for interpretive effects of head-movement, as Lechner recognizes [...], stands or falls on the correctness of [(80)]."

Response 1: The argument for SAHM is *not* dependent on the validity of (80). It is sufficient to demonstrate that (i) there is an independent diagnostic for the height of subject reconstruction and that (i) at least one context displays the properties consistent with the SAHM argument. This was seen to be the case in §3.4 (see discussion surrounding (67)).

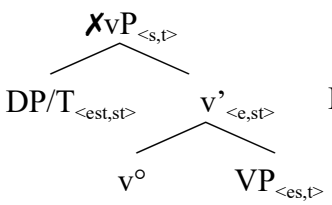
Response 2 (s. Reconstruction II): A subset of the effects previously attributed to the Strong Constraint falls out from the ETA.

(81) ***Extensional Traces and Antecedents (ETA)***
The denotations of generalized quantifiers and their traces do not include situation variables. (Thus, <et,t> is a possible type, but not e.g. <<e,st>,st> or <<s,et>,st>.)

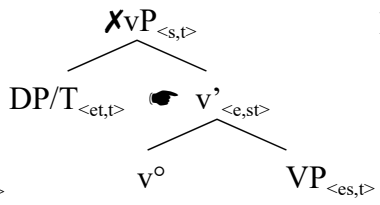
Consequence: Quantificational subjects cannot be interpreted in SpecvP (Johnson & Tomioka 1997).

(82) lists possible ways to interpret the thematic position of the subject. (82)a violates ETA, which bars intensional traces. (82)b abides by the ETA but results in a type mismatch. (82)c succeeds, because the computation combines with an s-variable first, followed by short subject QR.

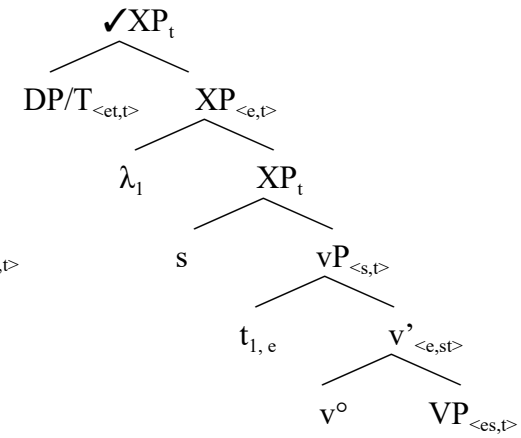
(82) a. *Subject* in-situ *(excluded by ETA)*



b. *Subject* in-situ *(type mismatch)*



c. *Subject interpreted* ex-situ



Corollary 1 of ETA: Subjects do not reconstruct into vP, i.e. below base position of the modal.

4. OLD EVIDENCE FOR SAHM II (*NEED*)

Goal: Provide evidence for SAHM from the behavior of transitive *need*.

(83) John needs no books.

NB: The argument is not considered in Hall (2015) and McCloskey (2016); but see Szabolcsi (2009, 2011) for further elaboration on this theme.

4.1. COMPLEMENTATION PROPERTIES

Control analysis: Dikken, Larson and Ludlow (1997) propose that *need* selects a silent control complement (s.a. von Fintel & Heim 2000: 94ff; Moltmann 1997:12ff; Harley 2004 on *want*).

(84) $John_1$ needs [PRO_1 <to have> no books]

Problem 1. Control subjects cannot be interpreted with narrow scope/*de dicto* (Landau 2010, a.m.o). The control analysis wrongly predicts (split) *de dicto* readings for (85) - (87) to be absent.

(85) No player needs a partner at this game. $(\neg\Box \succ \exists)$
"It is not necessary that a player has a partner."

(86) No king needs an escort. $(\neg\Box \succ \exists)$
"It is not necessary that a king has an escort."

(87) No dictator needs a parliament. $(\neg\Box \succ \exists)$
"It is not necessary that a dictator has a parliament."

(88) a. *de re* reading of (85)
$\neg\exists x[player(x)(w_0) \wedge \forall w'[Acc(w_0)(w') \rightarrow has\_a\_partner\_at\_this\_game(x)(w')]]$
b. Split reading of (85):
$\neg\forall w'[Acc(w_0)(w') \rightarrow \exists x[player(x)(w') \wedge has\_a\_partner\_at\_this\_game(x)(w')]]$

(89) *Model that satisfies de re reading* (88)a, *but not split reading* (88)b:

	a	b	c	*For any $x \in D_e$ and $w \in D_w$,*	
w_0	†	†	†	'†'	*x is not a player in w*
w_1	●	○	○	'○'	*x is a player in w*
w_2	○	●	○	'●'	*x is a player in w and x has a partner in w*

De re readings have exceedingly weak t-conditions, (85) would e.g. be verified by absence of players in evaluation world, irrespective of their properties.

Problem 2. Unlike control predicates, transitive *need* passivizes.

(90) a. Noone of you is needed any more.
b. Nothing is needed except confidence.
c. Nothing is needed from them.

Passivization affects abstract HAVE but is morphologically expressed on the overt head *need*.

(91) a. $[NP_1$ [need $[HAVE_{pass}$ $t_1]]]$
b. □ (TO_BE_HAD(NP_{Theme}))

Corresponding control structures in which the embedded predicate is passived are ill-formed:

(92) a. John tried to show confidence
b. *Confidence$_1$ tried PRO to be shown t_1
c. *Confidence$_1$ was tried PRO to be shown t_1

See also Wurmbrand (1999: 604) for related argument in support of a raising analysis of modals.

4.2. ANALYSIS AND EVIDENCE FOR SAHM

The argument for SAHM consists of three ingredients.

Ingredient 1. *need* is a propositional operator that embeds ***small clause*** headed by possessive HAVE.

(93) a. $[\![need]\!] = \lambda p.\lambda w.\forall w'[Acc(w)(w') \rightarrow p(w')]$
b. John needs noone
c. $[_{AgrSP}$ John$_1$ $[_{TP}$ needs$_3$ $[_{VP}$ t_3 $[_{sc}$ t_1 HAVE noone]]]]

In passives, embedded small clause is too small to contain subject and *needed* lacks internal case. Hence, object of HAVE undergoes raising to subject position:

(94) a. Noone is needed
b. $[_{AgrSP}$ ***noone$_1$*** $[_{TP}$ is $[_{VP}$ needed $[_{sc}$ HAVE ***t_1***]]]]

Passive *need* (90) looks just like long passive in German: the embedded predicate is too small to contain a subject and looses its ability to assign accusative.

(95) [weil der Wagen$_1$ [zu reparieren t_1] versucht$_{participle}$ wurde]
since the car to repair tried was
"since it was attempted to repair the car"

Ingredient 2. *need* raises from V° to T°:

(96) a. Work out which supplies you will ***need***$_3$ often ***t***$_3$, and which you will ***need***$_3$ less often ***t***$_3$.
b. Target those you are likely to ***need***$_3$ often ***t***$_3$.
c. The companies do not invest in antibiotics, which most people ***need***$_3$ rarely ***t***$_3$.
d. ASD patients ***needed***$_3$ rarely ***t***$_3$ reoperation.

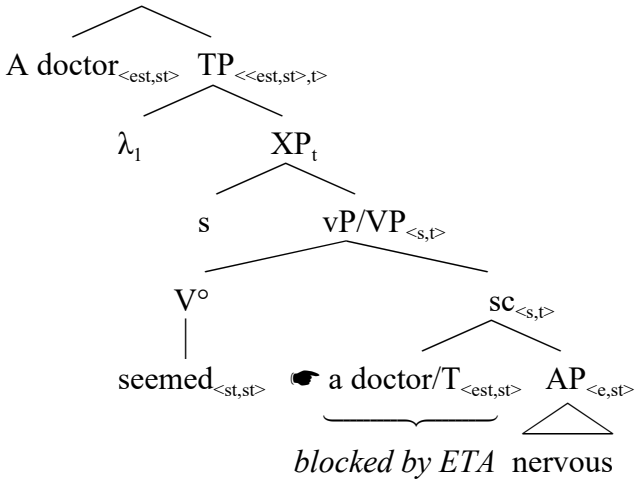
Ingredient 3 (s. Reconstruction II). Small clause subjects do not reconstruct for scope or referential transparency (Stowell 1991; Williams 1983; Moulton 2010, 2013; Lechner 2011, to appear):

(97) There are several empty seats in our otherwise totally full classroom. (Moulton 2013: (3))
a. #Two students seemed sick today. (*two students* ≻ *seem*/**seem* ≻ *two students*)
b. Two students seemed to be sick today. (*two students* ≻ *seem*/*seem* ≻ *two students*)

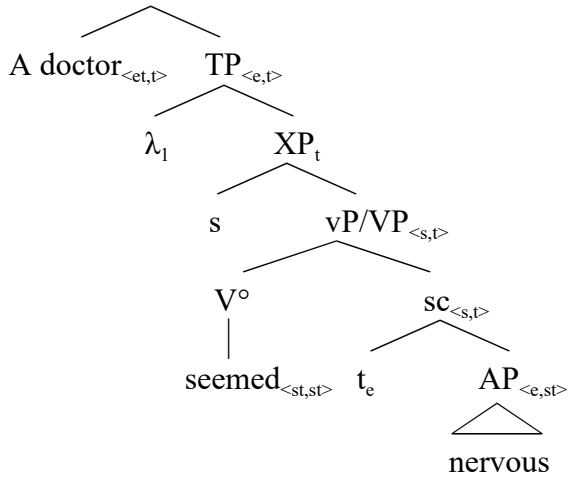
Corollary 2 of ETA: Quantificational subjects cannot be interpreted in subject position of small clauses.

(98) *Assumptions*
a. Small clauses consist of predicate, excluding functional structure (Johnson 2001, a.m.o.).
b. s-variables are located outside vP (fairly standard)
➜ ETA blocks narrow scope *de dicto* for small clause subjects.

(99) a. (✗narrow scope *de dicto*)



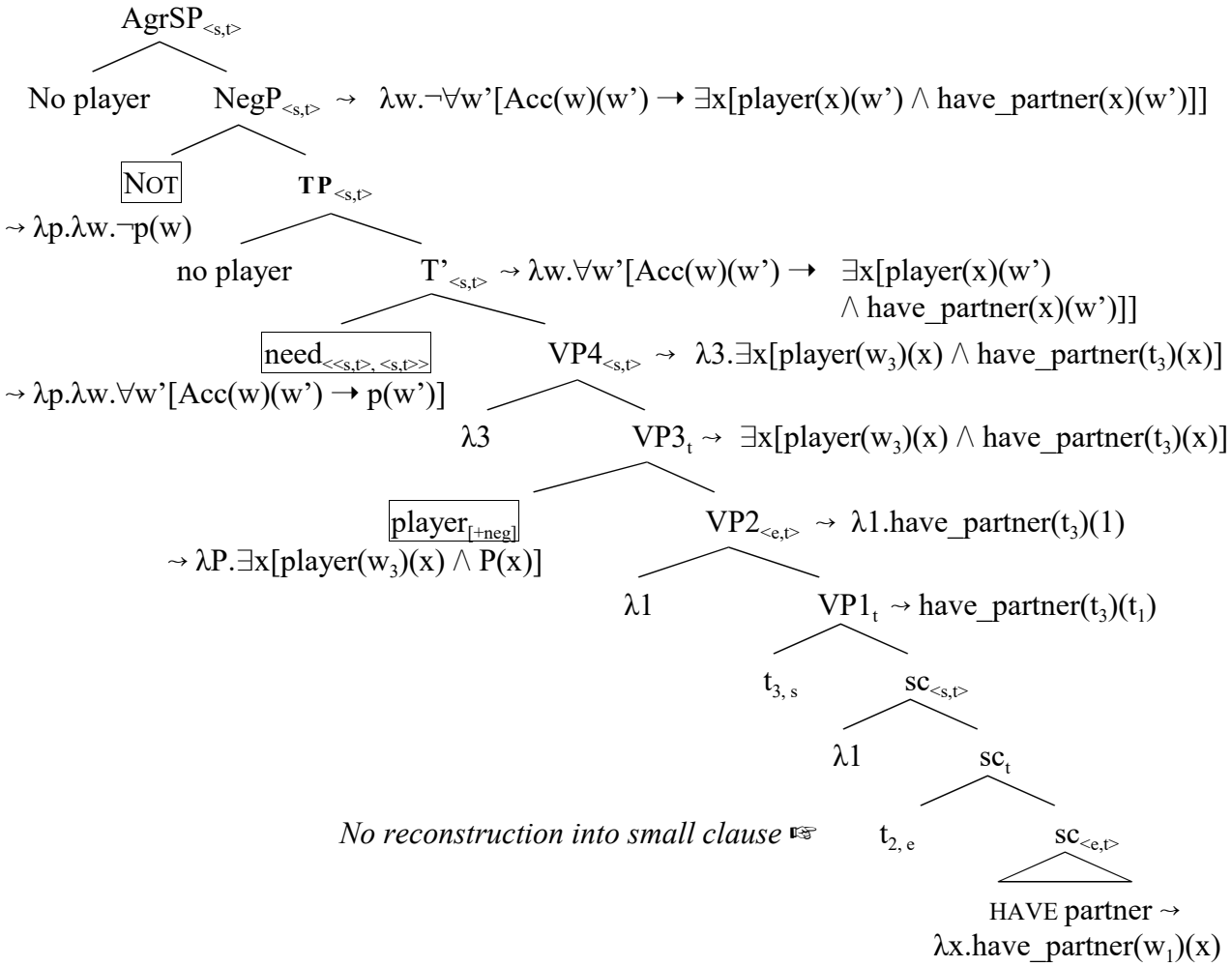
b. (✓wide scope *de re*)



From the ETA and the small clause analysis, it is possible to distill a final argument for SAHM.

(100) ***An argument for SAHM***
a. *need* originates in V°
b. The subject in (101) is interpreted *above* the base position of the modal (box).
➜ c. ∴ *need* is interpreted in a derived position, in support of **SAHM**.

(101) No player needs a partner (at this game) (¬□ ≻ ∃)



5. WHY ARE NEGATIVE DPS SCOPE RIGID?

In principle, the subject of (102) can be interpreted in three different positions. But only a single reading - the surface scope interpretation - is actually attested (see also Iatridou & Sichel 2011, i.a.).

(102) No $\text{critic}_{[+\text{Neg}]}$ is certain to like the movie.

a. $[_{\text{NegP}}$ NOT is $[_{\text{TP}}$ [no $\text{critic}_{[+\text{Neg}]}$] $[_{\text{VP/AP}}$ certain to like the movie]]] ¬∃ ≻ *certain*

b. *$[_{\text{NegP}}$ NOT is $[_{\text{TP}}$ $[_{\text{VP/AP}}$ certain $[_{\text{TP}}$ [no critic$]_{[+\text{Neg}]}$ to like the movie]]]] ¬ ≻ *certain* ≻ ∃

c. *is $[_{\text{TP}}$ $[_{\text{VP/AP}}$ certain $[_{\text{NegP}}$ NOT$[_{\text{TP}}$ [no critic$]_{[+\text{Neg}]}$ to like the movie]]]] *certain* ≻ ¬∃

Hypothesis: (102)c is ruled out by the same condition that prohibits (103)a: the *Improper Movement Constraint* (104).

(103) a. *A man_1 seems *there* to be t_1 in the room
b. seems *there* to be [a man] in the room

(104) *Improper movement constraint* (Agree-version)

If a category C partakes in an Ā-Agree dependency at node n, it must not enter into an A-dependency at a node that dominates n.

The subject of (102)c enters both an Ā-dependency ([+neg]-licensing) and an A-dependency (raising).

Moreover, the node delineating the Ā-dependency (☞) is dominated by the node which demarcates raising (☛). As a result, the derivation fails to satisfy the improper movement constraint.

(105) a. is $[_{TP}$ $[_{VP/AP}$ certain $[_{NegP}$ NOT ☞ $[_{TP}$ [no critic$_{[+Neg]}$] to ... *[+neg]-licensing*

b. ☛$[_{AgrSP}$[no critic$_{[+Neg]}$] is $[_{TP}$ $[_{VP/AP}$ certain $[_{NegP}$ NOT $[_{TP}$ to ... *Raising*

Note: Wh-dependencies and licensing of negatives have been given similar treatments before. Haegeman and Zanuttini (1996) e.g. express restrictions on negative NPs by the Neg-Criterion, which they model after the *wh*-criterion of Rizzi (1991).

Negative QPs also fail to reconstruct in simple clauses:

(106) No guest$_{[+neg]}$ $[_{NegP}$ didn't show up]. ¬∃¬⇔∀/* ¬¬∃ ⇔ ∃

This follows on the assumption that in non-negative concord languages languages such as English, each negative expression is paired with an abstract negation:

(107) $[_{NegP2}$ NOT [...[no guest]$_{[+neg]}$ $[_{NegP1}$ NOT $[_{Neg1}$, not $_{[+neg]}$ $[_{TP}$ t ... ¬∃¬ ⇔ ∀

Crucially, the [+neg]-feature analysis does not produce the unavailable scope order, because there is no motivation for reconstructing the subject *no guest* into the scope of the lower NOT (economy):

(108) *$[_{NegP2}$ NOT [... $[_{NegP1}$ NOT $[_{Neg1}$, not $_{[+neg]}$ $[_{TP}$ ***[no guest]**$_{[+neg]}$ ... ¬¬∃ ⇔ ∃

6. SUMMARY

The claim that there are instances of SAHM survives closer scrutiny, contra Hall (2015) and McCloskey (2016).

(109)
- New evidence for SAHM comes from
  - ATB-movement in comparatives
    Side benefit: evidence for covert ATB-movement, contra Boškovic and Franks (2000)
  - ATB-movement in coordination
- Review of old evidence solidifies the original arguments in support of SAHM. The evidence includes:
  - Split scope and *can*
  - Split scope and *need*
- Generalizations about reconstruction options are central for the older group of the SAHM arguments. These conditions fall out from a restriction on the logical type of QPs and their traces (ETA).
  - ETA derives ban on *in-situ* subjects.
  - ETA derives ban on reconstruction of small clause subjects.

Notes

1. Examples with a single modal also require the modal to take wide scope.

(i) Maria muss genau doppelt so viele Artikel veröffentlichen als sie Bücher herausgegeben hat.
Mary must exactly twice as many articles publish than she books edited has
"Mary has to publish exactly twice as many articles than she has edited books."

a. $\lambda w.\forall w'[Acc_{Deon}(w)(w') \rightarrow \iota d.$Mary is publishing d-many articles in w'] =
$\iota d.$Mary edited d-many books in w × 2 (*must* ≻ *MORE*)

b. $\lambda w.\iota d.\forall w'[Acc_{Deon}(w)(w') \rightarrow$ Mary is publishing d-many articles in w'] =
$\iota d.$Mary edited d-many books in w × 2 (**MORE* ≻ *must*)

2.V-end structures pattern along with the V2-paradigm:

(i) a. weil die Kandidaten gute Zeugnisse mitbringen müssen oder eine Prüfung bestehen müssen
☞ b. weil die Kandidaten gute Zeugnisse mitbringen oder eine Prüfung bestehen müssen
(□ ≻ ∧ / ∧ ≻ □)

3.On the syntax of negation and modals see, among many others, Belletti 1991; Erb 2001; Ernst 1992; Ouhalla 1990; Pollock 1989; Roberts 1993, 1998; Wurmbrand 1999, 2001. See Cormack & Smith 1998, 1999 for an alternative, non-derivational account of modals, with a non-standard mapping from syntax to interpretation.

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