LFG in an OT Setting: Modelling Competition and Economy

Joan Bresnan
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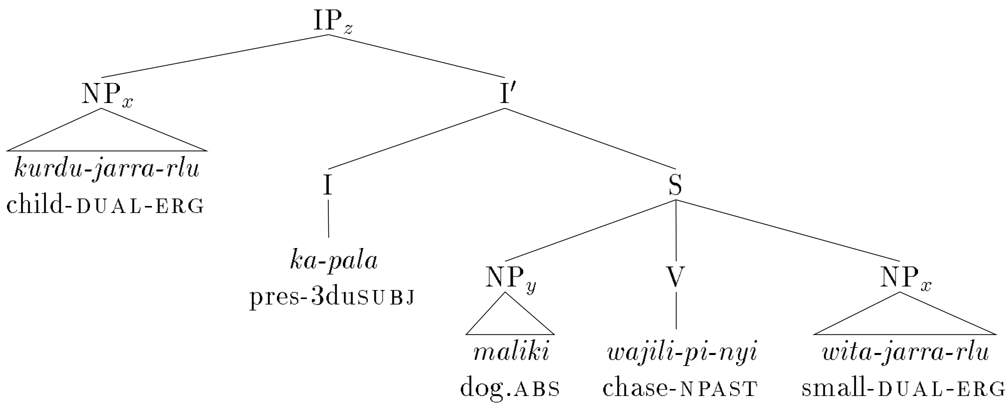
Part I: Competition and economy in LFG

1 Morphology vs. Syntax

Warlpiri nonconfigurationality (Simpson 1991, Kroeger 1993, Austin and Bresnan 1996)

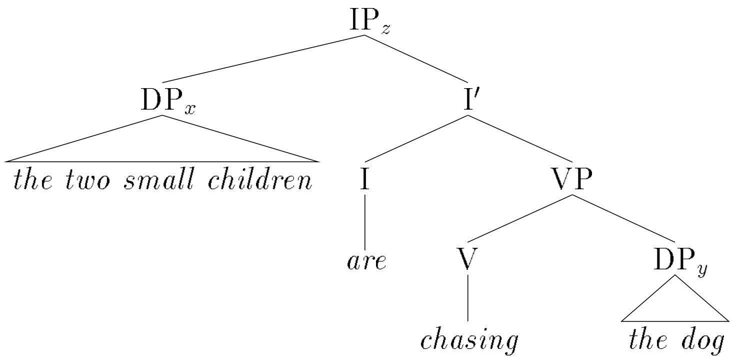
(1)

$$\left[\begin{array}{ll} \text{PRED} & \text{‘wajilipi- } \langle \text{x y} \rangle \text{’} \\ \text{TENSE} & \text{NPAST} \\ \text{ASPECT} & \text{PRES.IMPERF} \\ \text{FOC} & \\ \text{SUBJ} & [\text{ “kurdujarrarlu witajarrarlu” }]_x \\ \text{OBJ} & [\text{ “maliki” }]_y \end{array}\right]_z$$



(2)

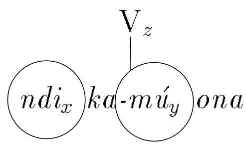
$$\left[\begin{array}{ll} \textsc{pred} & \text{‘chase } \langle \text{x y} \rangle \text{’} \\ \textsc{tense} & \textsc{pres} \\ \textsc{aspect} & \textsc{prog} \\ \textsc{subj} & [\ \text{“the two small children”}\ ]_x \\ \textsc{obj} & [\ \text{“the dog”}\ ]_y \end{array}\right]_z$$



Chicheŵa headmarking (Bresnan and Mchombo 1987, 1995)

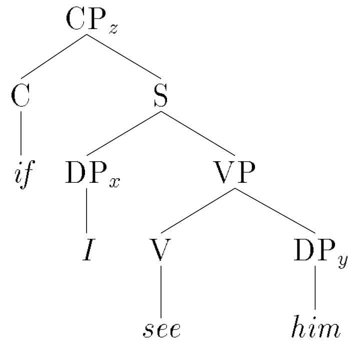
(3)

$$\left[\begin{array}{ll} \textsc{pred} & \text{‘see } \langle \text{x y} \rangle \text{’} \\ \textsc{mode} & \textsc{cond} \\ \textsc{subj} & [\ \text{“I”}\ ]_x \\ \textsc{obj} & [\ \text{“him/her”}]_y \end{array}\right]_z$$



(4)

$$\left[\begin{array}{ll} \textsc{pred} & \text{`see}\langle\text{x y}\rangle\text{'} \\ \textsc{mode} & \textsc{cond} \\ \textsc{subj} & [\text{ ``I'' }]_x \\ \textsc{obj} & [\text{ ``him''}]_y \end{array}\right]_z$$



(5) **Formal Model** (Kaplan and Bresnan 1982):

(i) ('Lexical integrity':) Morphologically complete words are leaves of the c-structure tree and each leaf corresponds to one and only one c-structure node.

(ii) A word and a phrase correspond to the same (type of) f-structure.

(6) V_z — does

$$\left[\begin{array}{ll} \textsc{subj} & \left[\begin{array}{ll} \textsc{pers} & 3 \\ \textsc{num} & \textsc{sg} \end{array}\right] \\ \textsc{tns} & \ldots \\ \textsc{pred} & \ldots \end{array}\right]_z$$

(7) **Theory** (Bresnan 1982, 1996a, Mohanan 1982, Simpson 1983, 1991, Zaenen, Maling and Thraínsson 1985, Kroeger 1993):

(i) ('Nonconfigurationality':) There is a nonprojective, exocentric category S.

(ii) ('Dependent marking':) Case morphology corresponds to a function $(\uparrow \textsc{gf}) = \downarrow$ in the local f-s. (Obliqueness of case corresponds inversely to syntactic rank.)

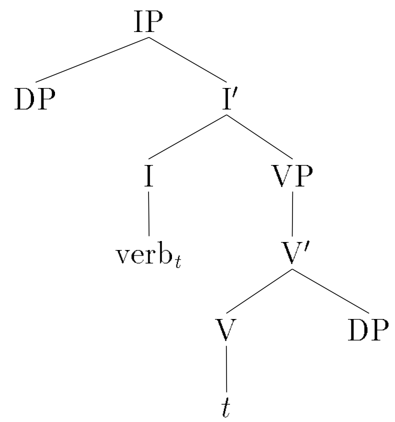
(iii) ('Head marking':) Agreement morphology corresponds to a function $(\uparrow \text{GF}) = \downarrow$ in the local f-s. (The order of agreement corresponds directly to syntactic rank.)

(iv) ('Endocentricity':) A category and its X′ head correspond to the same f-s. XP in specifier, complement, or adjunct position corresponds to a (specifier, complement, or adjunct) function $(\uparrow \text{GF}) = \downarrow$ in the local f-s. (Prominence in the c-structure hierarchy corresponds to syntactic rank.)

2 Head positions

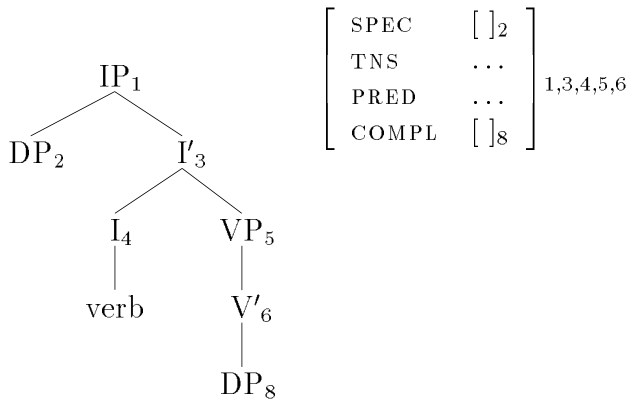
Head movement:

(8)



Functional correspondence between head positions:

(9)



(10) **Theory** (Kroeger 1993, King 1995, Bresnan 1996a,c):

(i) A functional category F^0 and its complement correspond to the same f-s.[1]

(ii) Every category has a(n extended) head.[2]

(11) a. [*Dem Nachbarn Kirschen angeboten*] *hat er nicht oft.*

b. *[*Dem Nachbarn Kirschen an*] *bot er nicht oft.*

'He didn't offer his neighbor cherries often.' (Haider 1993: p. 63)

Question: Isn't this just a notational variant of head movement?
Answer: No. It is more general, predicting that information from the same feature structure may appear distributed across multiple lexically filled heads in the categorial structure (Niño 1995a,b, Nordlinger and Bresnan 1996, Bresnan 1996c, Börjars, Chapman, and Vincent 1996).

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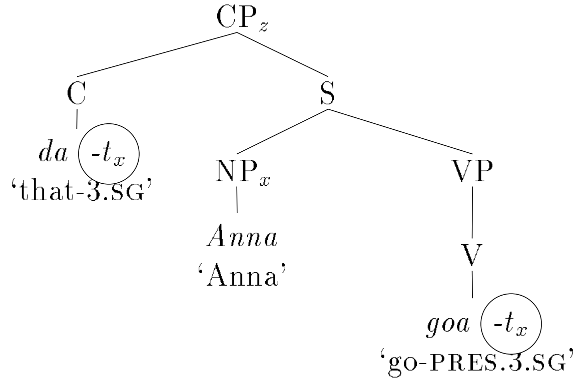
[1] Functional heads F^0 are specialized subclasses of lexical heads which have a syncategorematic role in the grammar (such as marking subordination, clause type, or finiteness).

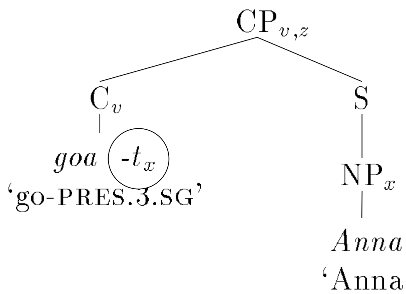
[2] X is an **extended head** of Y if X corresponds to the same f-s as Y, X is of the same/nondistinct category type as Y, and every node other than Y that dominates X also dominates Y. (M. Jar (n.d.), Zaenen and Kaplan (1995: 221–2), Bresnan 1996b). Cf. also Grimshaw 1995

West Flemish verb/complementizer agreement (Haegeman 1992, 1996; Zwart 1993, 1996; Bresnan 1996c)

(12) $$\left[\begin{array}{ll} \textsc{pred} & \text{‘go}\,\langle\text{x}\rangle\text{’} \\ \textsc{tense} & \textsc{past} \\ \textsc{subj} & \left[\text{ “Anna” }\right]_x \end{array}\right]_z$$

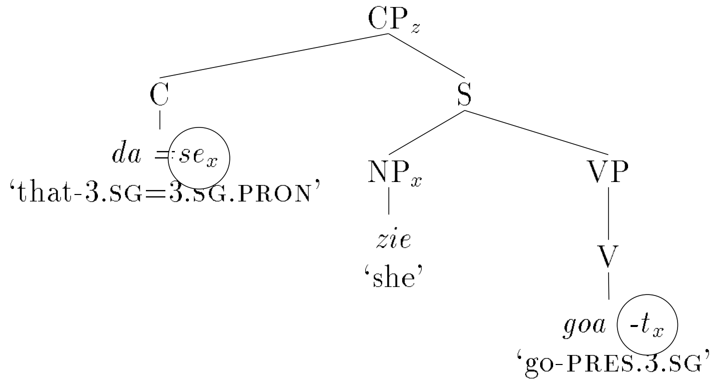


(13) $$\left[\begin{array}{ll} \textsc{type} & \text{Q} \\ \textsc{pred} & \text{‘go}\,\langle\text{x}\rangle\text{’} \\ \textsc{tense} & \textsc{past} \\ \textsc{subj} & \left[\text{ “Anna” }\right]_x \end{array}\right]_z$$

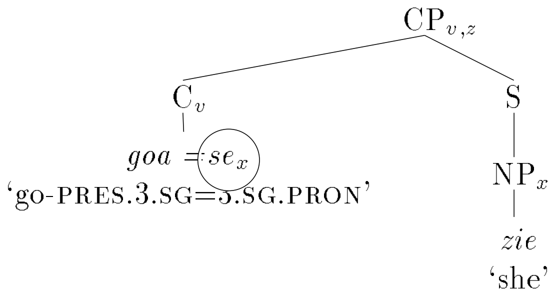


W. Flemish C^0 clitic (doubling pronominal subject)

(14) $\left[\begin{array}{ll} \textsc{pred} & \text{‘go}\langle \text{x} \rangle\text{’} \\ \textsc{tense} & \textsc{past} \\ \textsc{subj} & \left[\ \text{“she”}\ \right]_x \end{array}\right]_z$



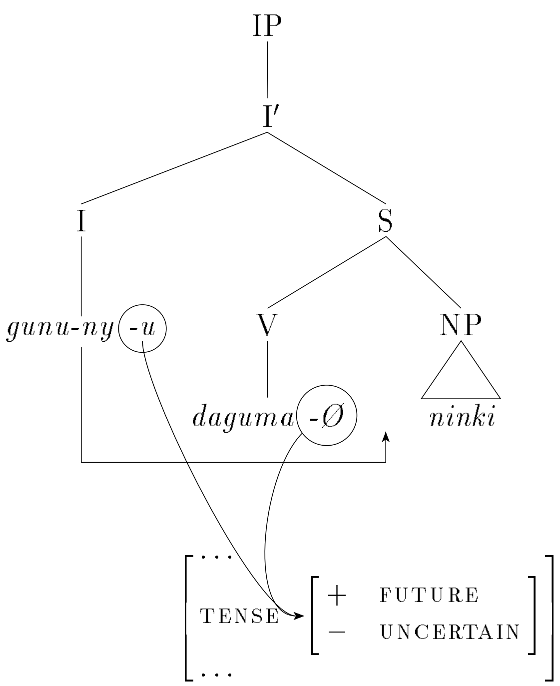
(15) $\left[\begin{array}{ll} \textsc{type} & \text{Q} \\ \textsc{pred} & \text{‘go}\langle \text{x} \rangle\text{’} \\ \textsc{tense} & \textsc{past} \\ \textsc{subj} & \left[\ \text{“she”}\ \right]_x \end{array}\right]_z$



Wambaya discontinuous tense (Nordlinger and Bresnan 1996)

(16) a. *Daguma-Ø gunu-ny-u ninki*!
hit-UNM 3SG.M.A-2.O-[+FUTURE] this.SG.M.ERG
‘He’s going to hit you!’ = **Immed. Future tense**

b.



3 Economy of expression

Question: Why doesn't rich morphology occur in peaceful coexistence with empty categories through unificaiton?
Answer: Something is missing from the theory.

(17) * [**Op**$_i$]$_{\text{OBJ}}$ ... [... **pron**$_i$ ...]$_{\text{SUBJ}}$ ... [e_i] ...

(18) **Weak crossover in Hindi** (Mahajan 1990, Bresnan 1996d)

[**kis-ko**$_i$/**sab-ko**$_i$	**uskii**$_i$	bahin	pyaar	kartii	thii?]
who-(DO)/ *everyone*-(DO)	*his*	*sister*.(SUB)	*love*	*do*.IMP.F	*be*.PST.F

'Who$_i$/Everyone$_i$ was loved by his$_i$ sister?/.'
Lit.: *'Who$_i$/everyone$_i$ (did) his$_i$ sister love?/.' (Mahajan 1990: p. 25)

(19)

*[**kis-ko**$_i$/**sab-ko**$_i$	**uskii**$_i$	bahin-ne	socaa	[ki
who.(DO)/*everyone*.(DO)	*his*	*sister*-(SUB)	*thought*	*that*

raam-ne	[e]$_i$	dekhaa	thaa]?]
Ram-(ESUB)		*seen*	*be*.PST

'Who$_i$ was it that his$_i$ sister thought that Ram had seen him$_i$?'
'Everyone was such that his sister thought that Ram had seen him.'

(20) **Weak crossover in German** (Frey 1993, Berman 1996)

Wen$_i$	liebt	seine$_i$	Mutter?
who.ACC	loves	his	mother.NOM

Lit.: 'Who$_i$ does his$_i$ mother love?'

*Wen$_i$	sagte	dir	seine	Mutter,	daß	der	Max	__	liebt?
who.ACC	said	you.DAT	his	mother.NOM	that	the.NOM	Max		loves

'Who$_i$ did his$_i$ mother tell you that Max loves?'

(21) **Theory** (Bresnan 1996a,d):

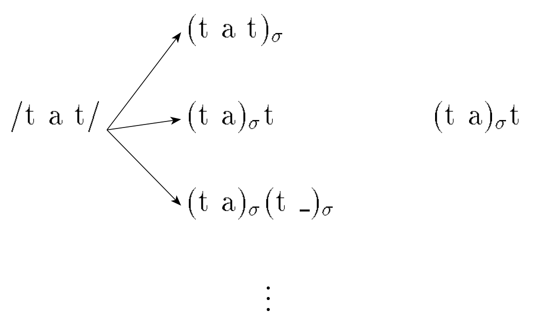
(i) All syntactic (nonpreterminal) c-s nodes are optional, and are not used unless required.

(i) A gap [*e*] corresponds to a DF (TOP or FOC) in the (possibly) nonlocal f-structure: $(\ldots\uparrow)\text{DF} = \downarrow$.

Part 2. LFG in an OT setting

(22) **Optimality Theory** (Prince and Smolensky 1993)

(a) INPUT CANDIDATES OUTPUT



(b) GEN: INPUT→ CANDIDATES

(c) EVAL: CANDIDATES → OUTPUT

(23) EVAL

(i) There is a universal Constraint Set.

(ii) Language-particularity consists of a ranking of the Constraints.

(iii) The optimal/most harmonic/least marked candidate (= the output for a given input) is one such that, if it violates any constraint which a competitor satisfies, the competitor violates a higher ranked constraint which it satisfies.

1. The Input

(24) see(x,y), x=John, y=who

(25)
$$\begin{bmatrix} \textsc{pred} & \text{‘see(x,y)’} \\ \textsc{gf}_1 & [\text{“John”}]_x \\ \textsc{gf}_2 & [\text{“who”}]_y \\ \textsc{tns} & \text{‘past’} \end{bmatrix}$$

2. GEN

(26) a. a universal LFG (universal c-s schemata, lexicon/morphology)

b. substantive constraints of syntactic theory largely decoupled from formal generation mechanism: former $\rightarrow$ EVAL, latter $\rightarrow$ GEN

3. The Candidate Set

(27) Pairs: $<$ c-s with lexical feature structures, f-s $>$

```
      S_z                [Pred  see(x,y)
     /  \                 S   [``John'']_x
   DP_x  VP               O    [``Mary'']_y
   J.    / \              Tns   past          ]_z
 [  ]  V    DP_y
      saw  Mary
     [   ] [  ]
```

(28)

```
     S_z            [Pred  see(x,y)
    / | \            S  [``John'']_x
  DP_x V  DP_y       O   [``Mary'']_y
   J. saw  M.        Tns   past         ]_z
  [ ] [ ] [ ]
```

(29)

```
    IP_z            [Pred  see(x,y)
    / \              S  [``John'']_x
  DP_x I'            O   [``Mary'']_y
   J.  / \           Tns   past         ]_z
  [  ] I   VP
       e  / \
         V  DP_y
        saw Mary
        [ ] [  ]
```

4. Constraints

(0) **Faithfulness** All and only the attributes of input lexical heads appear in output. [PARSE and FILL]

(I) **A- to F-structure Alignment** (cf. Bresnan and Zaenen 1990, Legendre, Raymond, and Smolensky 1993)

(II) **Economy of Expression** DON'T PROJECT: for fixed lexical choice and equivalent f-structures, pick the c-structure with fewest non-preterminal nodes.

(IIIA) **C- to F-structure Alignment: Endocentricity Constraints** (7(iv))

(IIIB) **C- to F-structure Alignment: Morphological Constraints** (7(ii)–(iii))

5. Toy Example

(30) a. ENDOCENTRICITY > DON'T-PROJECT: configurationality

b. DON'T-PROJECT > ENDOCENTRICITY: nonconfigurationality

c. prediction: there exists emergent configurationality/nonconfigurationality

6. A Detailed Example: English Verb Inversion

Grimshaw's (1995) Constraints (Bresnan 1996b)

(31) (i) OP-SPEC: every 'syntactic operator' must occur in a sufficiently prominent SPEC position in c-structure.

(ii) *LEX-F: no lexical heads in functional categories.

(iii) OB-HD: every projected category (X', X'') has a lexically filled (extended) head.

(iv) FULL-INT: FILL PRED (Bresnan 1996b)

(v) STAY: Categories dominate their extended heads.

(32) a. What will they read?

b. *What they will read?

c. *They will read what? [prosodically marked]

(33) INPUT =

PRED	'read(x,y)'
GF_1	["they"]$_x$
QFOC,GF_2	["what"]$_y$
TNS	'fut'

(34) Tableau 1: Matrix interrogatives:

		CANDIDATES:	OP-SPEC	OB-HD	STAY
	i	[$_{IP}$ DP will [$_{VP}$ read what]]	*!		
	ii	[$_{CP}$ *e* [$_{IP}$ DP will [$_{VP}$ read what]]]	*!	*	
	iii	[$_{CP}$ what *e* [$_{IP}$ DP will [$_{VP}$ read [*e*]]]]		*!	*
	iv	[$_{CP}$ what will [$_{IP}$ DP *e* [$_{VP}$ read [*e*]]]]			*!*
⇒	v	[$_{CP}$ what will [$_{S}$ DP [$_{VP}$ read [*e*]]]]			*

(35)

```
    CP
   /  \
  DP   C'
  |   /  \
what C    IP
[  ] |   / \
   will DP  I'
   [  ] |   |
       they VP
       [  ] /\
           V  DP
           |   |
         read  e
         [  ]
```

```
[Pred   read(x,y)
 Tns    fut
 S      [``they'']_x
 QFOC,O [``what'']_y ]
```

```
     CP
    /  \
  DP    C'
  |    / \
what  C   S
[  ]  |  /  \
    will DP  VP
    [  ] |  /  \
       they V  DP
       [  ] |  |
          read e
          [  ]
```

Negation and *do*

(36) a. John either did or did not leave.

b. Mary both may not and must not come.

c. You either were not or are not included.

(37) a. He did not leave.

b. He didn't leave.

(38)

```
       IP
      /  \
     DP   I'
     |   / \
   John I   VP
       / \   |
      I  not V
      |      |
     did    leave
```

(39) a. *John not left.

b. *Not John left.

c. *John left not.

d. John did not leave.

Standard sentence negation most often realized crosslinguistically as a verbal category (Payne 1985): a full negative verb (e.g. Unseth 1994), a negative auxiliary verb, negative verbal morphology, or an invariant negative particle adjoined to the finite verb.

Structure (38) is one instantiation of a universal, violable constraint on categorization classifying standard sentence negation as a verbal category.
Modern English adjoins *not* to I, not C or V:

(40) a. He did not leave

b. *Did not he leave?

c. *He left not.

(41) NEG-TO-I: A negative particle adjoins to I.

(42) Didn't he leave?

(42) follows from (i) the classification of finite verbs into *lexical verbs* and *functional verbs* ("auxiliaries"); (ii) the ranking *LEX-F > OB-HD.

7. Evidence for Imperfect Correspondence

(43) a. Isn't she smart? ~ She isn't smart.

b. Aren't you smart? ~ You aren't smart.

c. Aren't I smart? ~ *I aren't smart.

(44) *Am not I smart? ~ I am not smart.

Formal feature approach:

(45) $\text{verb}_{aux,fin}$ ϵ F
verb_{fin} ϵ V

(46) *aren't* ϵ C [first person singular]

(47)

	sg	pl
1	am	are
2	are	are
3	is	are

	sg	pl
1		aren't
2	aren't	aren't
3	isn't	aren't

**ain't*

(48)

```
  F_z         [Tns     'Pst'
   |           Pol     'neg'
 isn't         S       [Pers  3
                        Num   sg] ]_z
```

(49)

```
  I_z         [Tns     'Pst'
 / \           Pol     'neg'
I   not        S       [Pers  3
|                       Num   sg] ]_z
is
```

(50)

```
      F_z        [Tns     'Pst'
       |          Pol     'neg'
    aren't        S       [Pers _
                           Num  _ ] ]_z
```

(51) Tableau 9: negative third person plural input

		INPUT < neg 3 pl >	FILL-PERS	FILL-NUM	PARSE-PERS	PARSE-NUM
	i	isn't < neg 3 sg >		*!		*
	ii	is not < neg 3 sg >		*!		*
⇒	iii	aren't < neg (P)(N) >			*	*
⇒	iv	are not < neg (P)(N) >			*	*
	v	am not < neg 1 sg >	*!	*	*	*

(52) Tableau 13: negative first person plural input

		INPUT < neg 1 pl >	FILL-PERS	FILL-NUM	PARSE-PERS	PARSE-NUM
	i	isn't < neg 3 sg >	*!	*	*	*
	ii	is not < neg 3 sg >	*!	*	*	*
⇒	iii	aren't < neg (P)(N) >			*	*
⇒	iv	are not < neg (P)(N) >			*	*
	v	am not < neg 1 sg >		*!		*

(53) Tableau 14: negative first person singular input

		INPUT < neg 1 sg >	FILL-PERS	FILL-NUM	PARSE-PERS	PARSE-NUM
	i	isn't < neg 3 sg >	*!		*	
	ii	is not < neg 3 sg >	*!		*	
	iii	aren't < neg (P)(N) >			*	*
	iv	are not < neg (P)(N) >			*	*
⇒	v	am not < neg 1 sg >				

(54) Tableau 15:

		INPUT < Q neg 1 sg >	NEG-I	FILL-P	FILL-N	PARSE-P	PARSE-N
	i	isn't < Q neg 3 sg >		*!		*	
	ii	is not < Q neg 3 sg >	*!	*!		*	
⇒	iii	aren't < Q neg (P)(N) >				*	*
	iv	are not < Q neg (P)(N) >	*!			*	*
	v	am not < Q neg 1 sg >	*!				

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