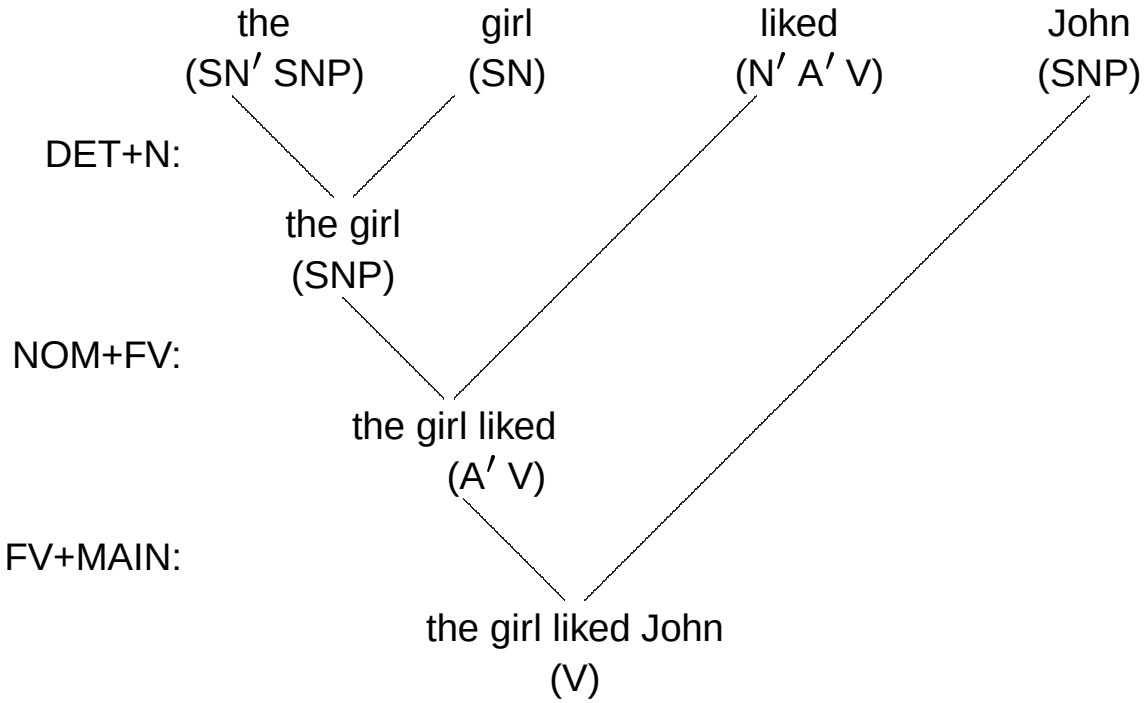
17. LA-syntax for English

17.1 Complex fillers in pre- and postverbal position

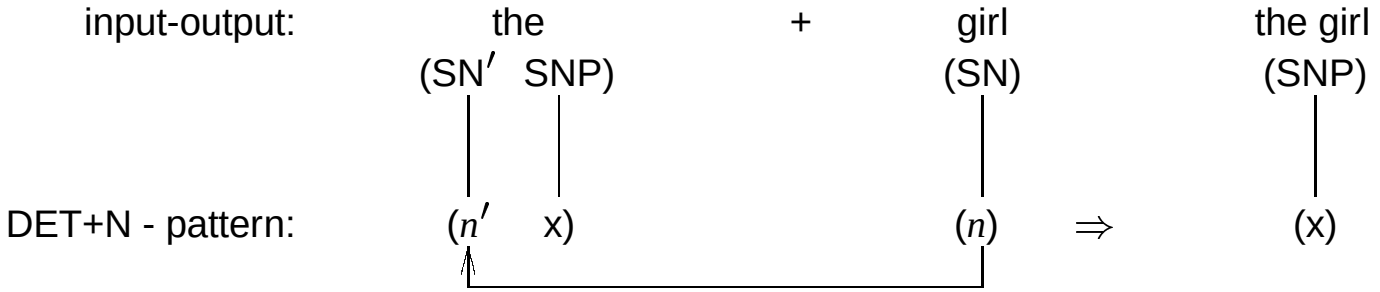
17.1.1 Determiner and noun categories of English

categories	*surfaces*	*examples of lemmata*
singular and plural determiners:		
(SN′ SNP)	a, an, every, the	[a (SN′ SNP) *]
(PN′ PNP)	all, several, the	[all (PN′ PNP) *]
singular and plural nouns:		
(SN)	man, woman, book, car	[woman (SN) *]
(PN)	men, women, books, cars	[men (PN) *]

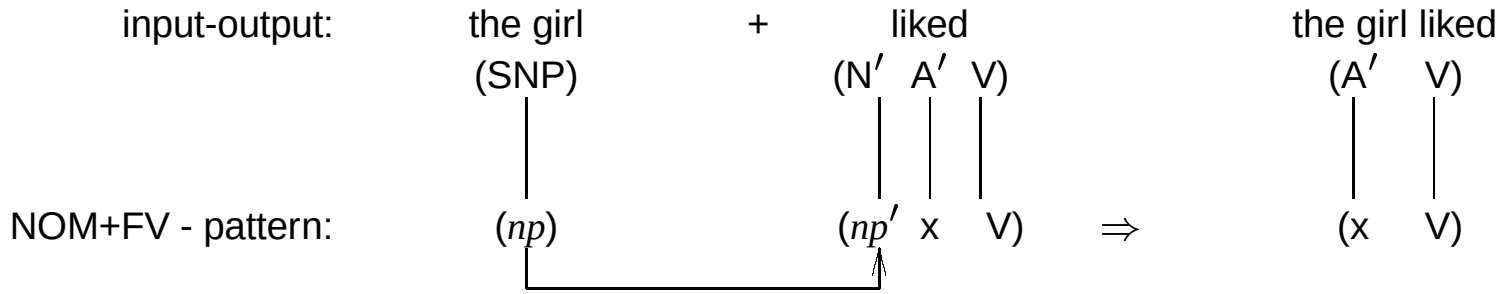
17.1.2 Complex noun phrase before the valency carrier



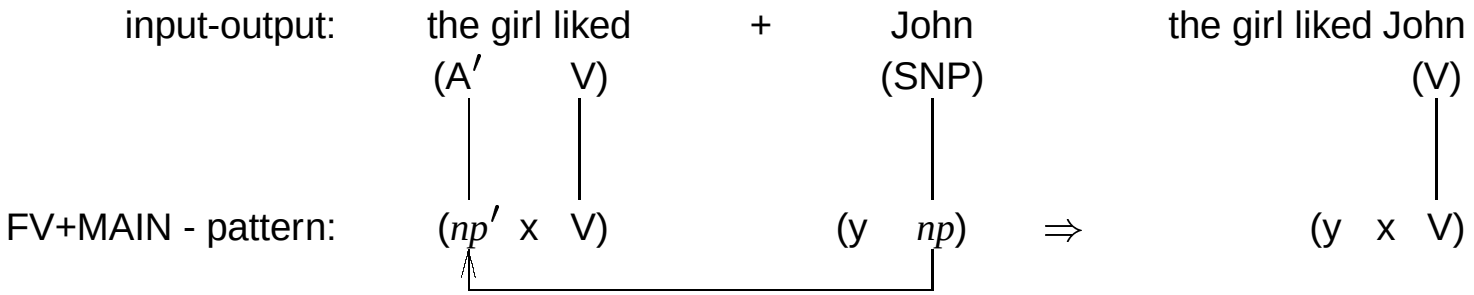
17.1.3 Preverbal application of Det+N



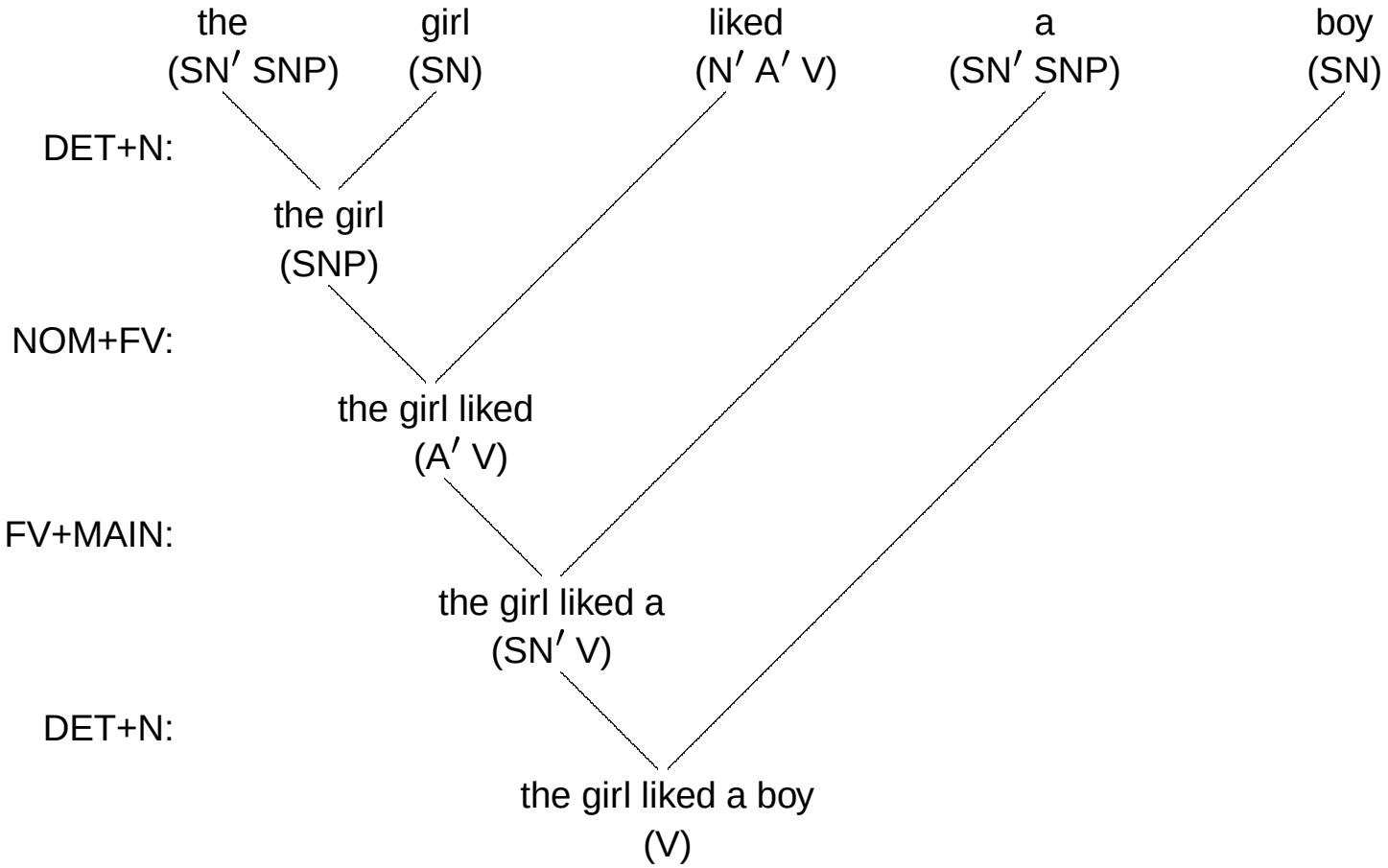
17.1.4 Application of NOM+FV to complex nominative NP



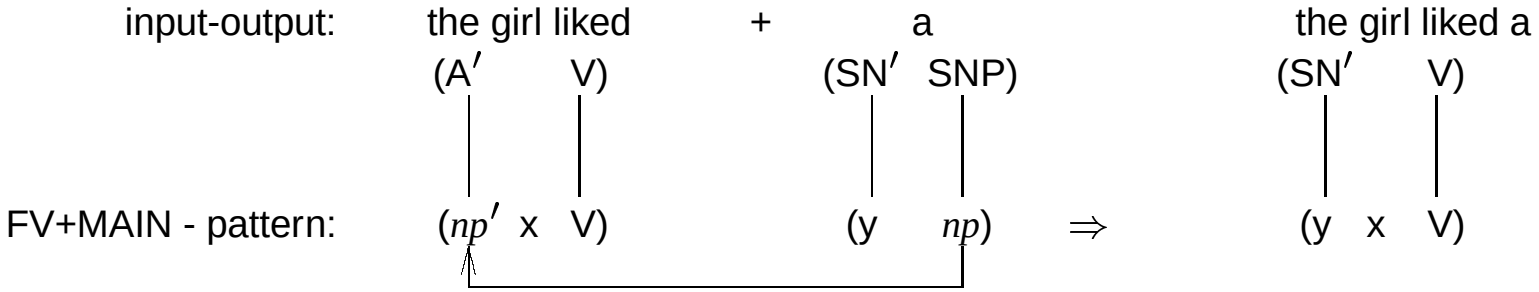
17.1.5 FV+MAIN adding elementary object NP



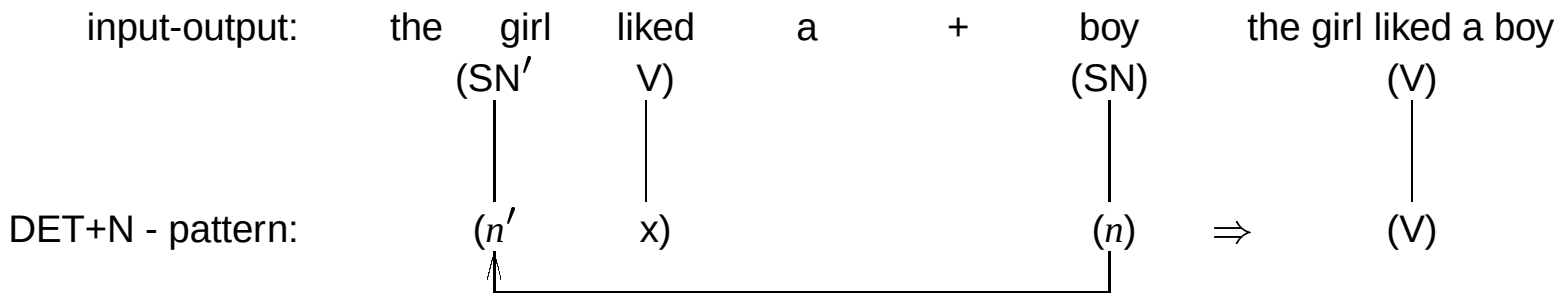
17.1.6 Complex noun phrase after valency carrier



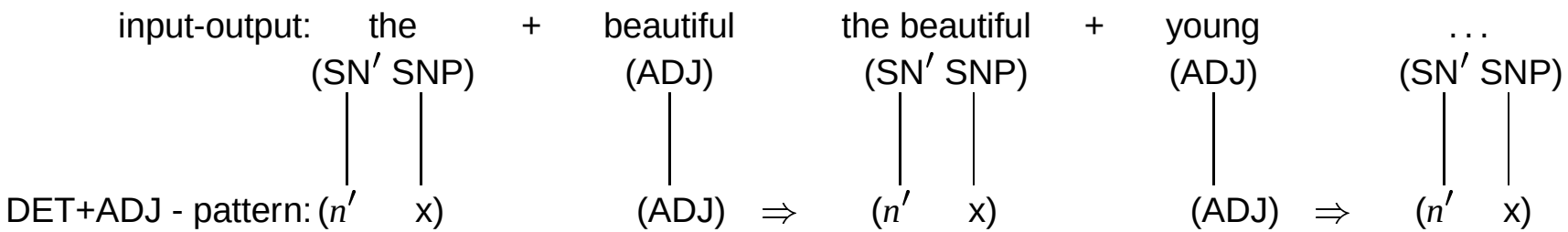
17.1.7 FV+Main adding beginning of complex object NP



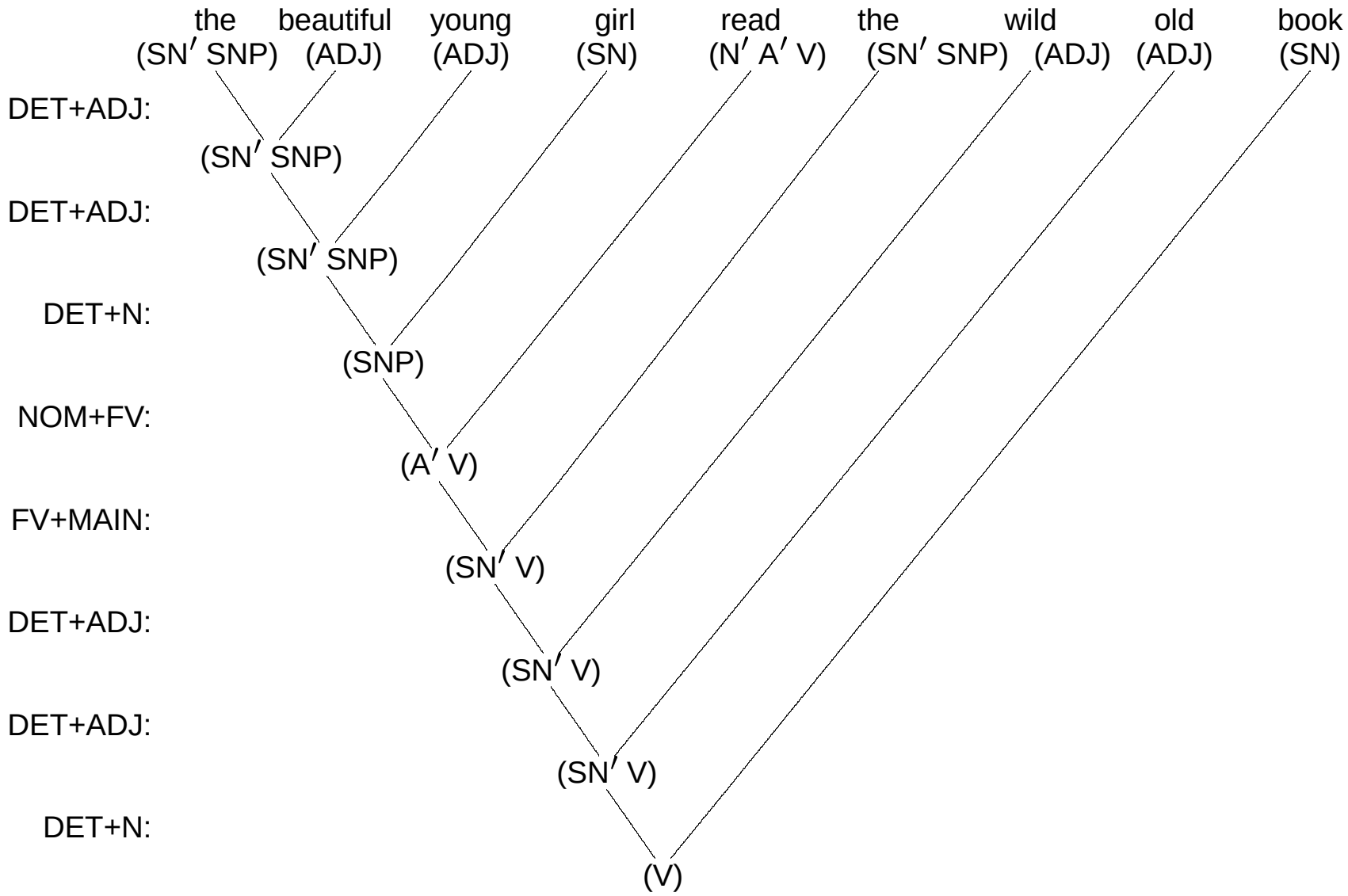
17.1.8 Postverbal application of Det+N



17.1.9 DET+ADJ recursively adding adjectives

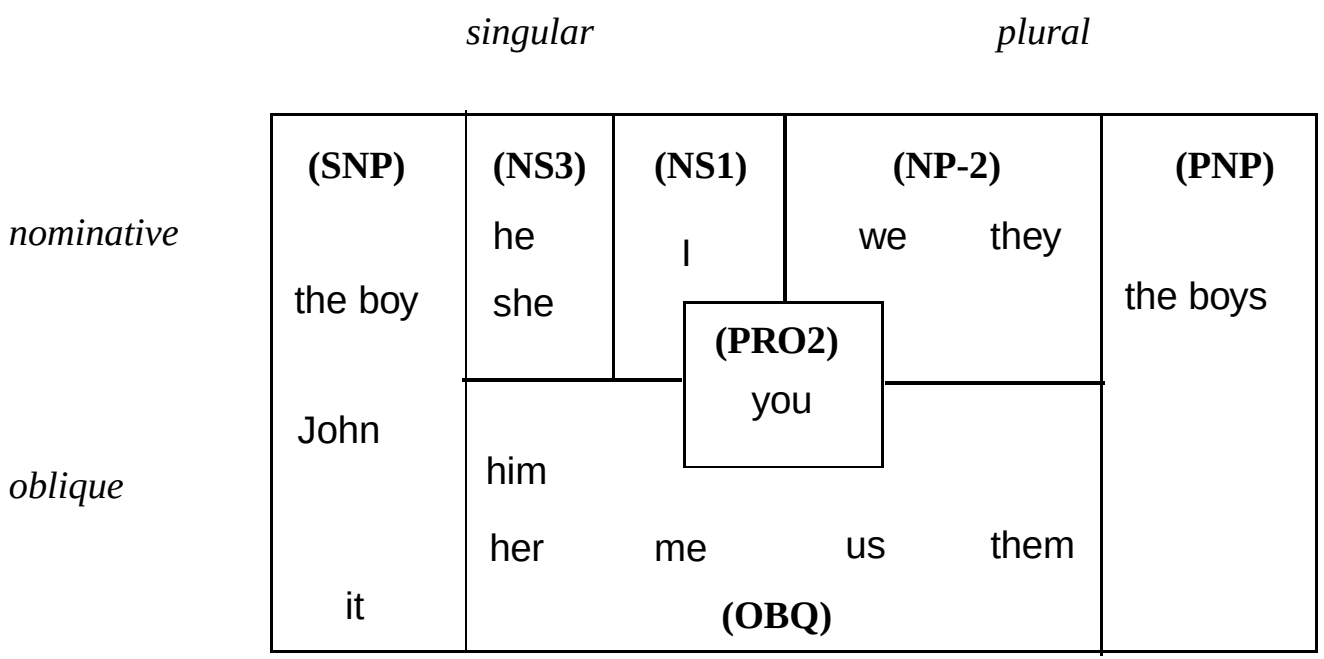


17.1.10 Complex noun phrases with adjectives

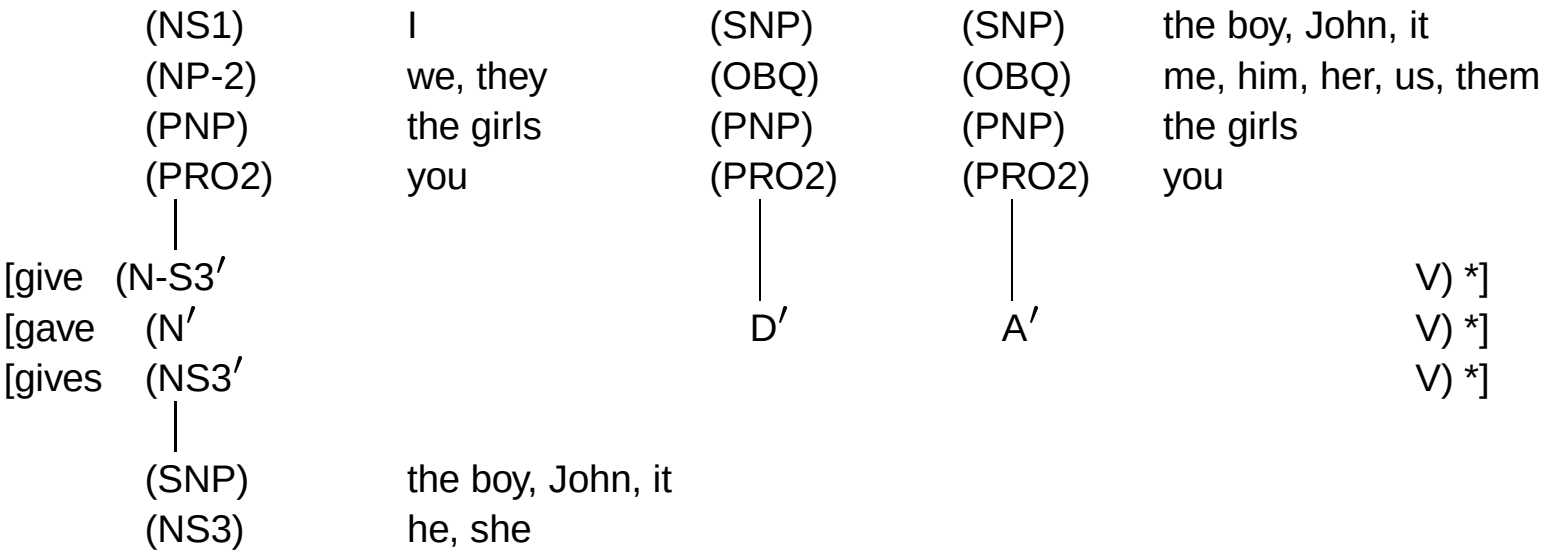


17.2 English field of referents

17.2.1 Categories of nominal valency fillers in English

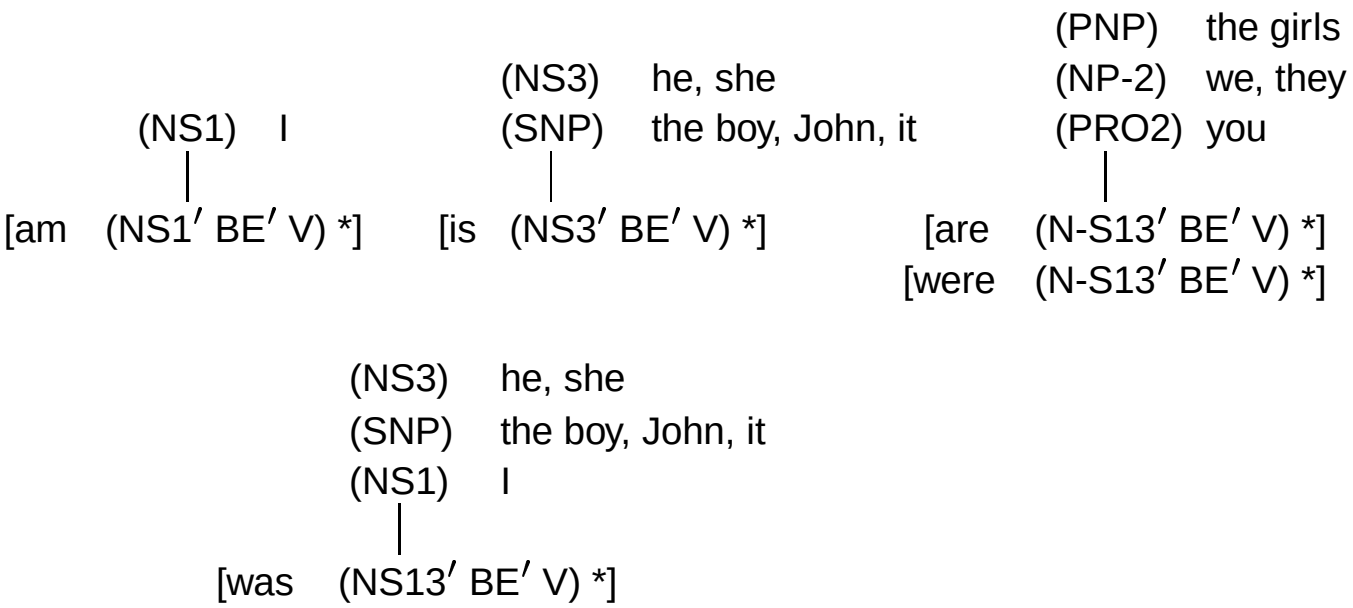


17.2.2 Agreement of fillers and valency in main verbs

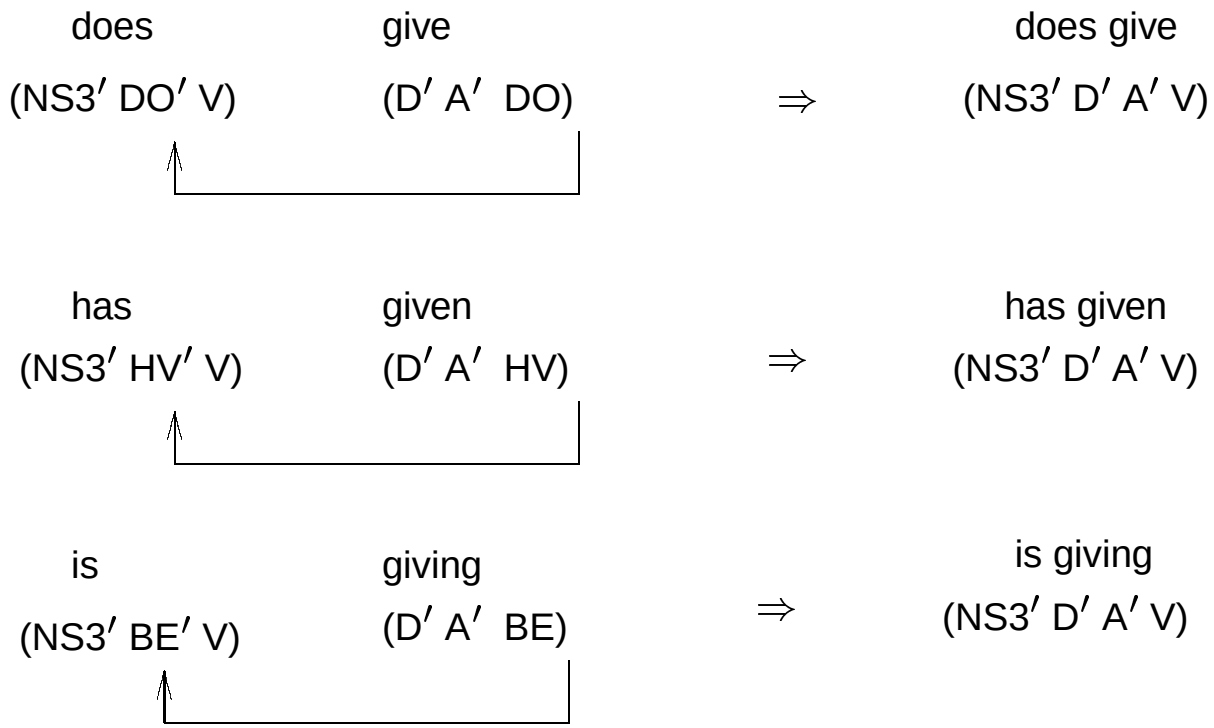


17.3 Complex verb forms

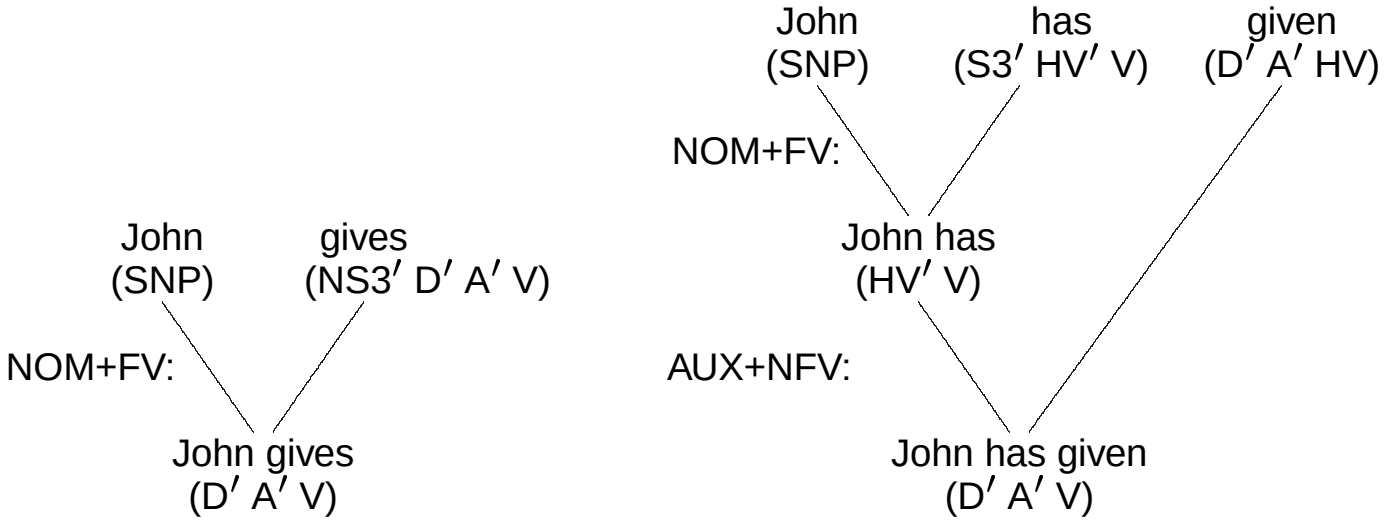
17.3.1 Nominative agreement of the auxiliary be



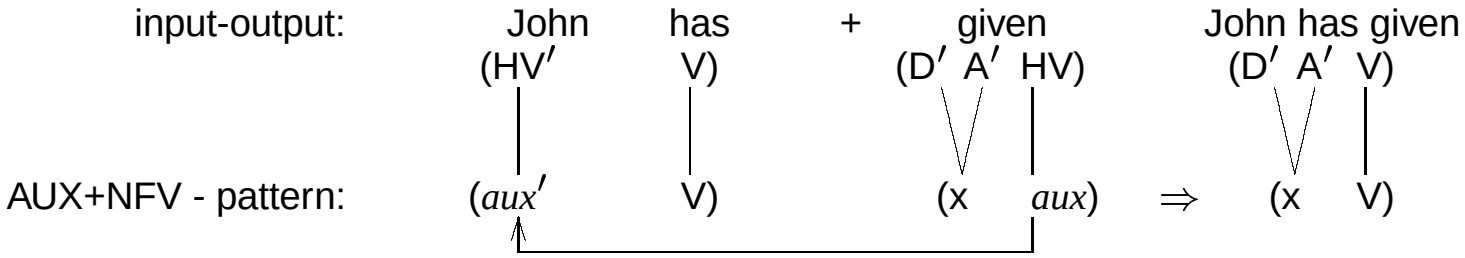
17.3.2 Complex verb forms of English



17.3.3 Comparing basic and complex verb forms of English



17.3.4 AUX+NFV adding a nonfinite verb



17.4 Finite state backbone of LA-syntax (*LA-E2*)

17.4.1 *LA-E2*: an English LA-syntax with complex NPs

LX $=_{def}$ {[Julia (SNP) *], [John (SNP) *], [Suzy (SNP) *], [it (SNP) *],
[boy (SN) *], [boys (PN) *], [girl (SN) *], [girls (PN) *], [book (SN) *],
[books (PN) *], [a (SN′ SNP) *], [every (SN′ SNP) *], [the (SN′ SNP) *],
[all (PN′ PNP) *], [several (PN′ PNP) *], [the (PN′ PNP) *]
[I (NS1) *], [you (PRO2), [he (NS3) *], [she (NS3) *], [it (SNP) *],
[we (NP-2) *], [they (NP-2) *], [me (OBQ) *], [him (OBQ) *],
[her (OBQ) *], [us (OBQ) *], [them (OBQ) *]
[am (NS1′ BE′ V) *], [is (NS3′ BE′ V) *], [are (N-S13′ BE′ V) *]
[was (NS13′ BE′ V) *], [were (N-S13′ BE′ V) *]
[have (N-S3′ HV′ V) *], [has (NS3′ HV′ V) *], [had (N′ HV′ V) *]
[do (N-S3′ DO′ V) *], [does (NS3′ DO′ V) *], [did (N′ DO′ V) *]
[give (N-S3′ D′ A′ V) *], [gives (NS3′ D′ A′ V), [gave (N′ D′ A′ V) *],
[give (D′ A′ DO) *], [given (D′ A′ HV) *], [giving (D A BE) *]
[like (N-S3′ A′ V) *], [likes (NS3′ A′ V), [liked (N′ A′ V) *]
[like (A′ DO) *], [liked (A′ HV) *], [liking (A′ BE) *]
[sleep (N-S3′ V) *], [sleeps (NS3′ V) *], [slept (N′ V) *]
[sleep (DO) *], [slept (HV) *], [sleeping (BE) *]}

Variable definition:

np' ε {N', N-S3', NS1', NS3', NS13', N-S13', D', A'}, (valency positions)

np ε {PRO2, NS1, NS3, NP-2, SNP, PNP, PN, OBQ} (valency fillers), and

if *np* = PRO2, then $np' \epsilon$ {N′, N-S3′, N-S13′, D′, A′},

if *np* = NS1, then $np' \epsilon$ {N′, N-S3′, NS1′, NS13′},

if *np* = NS3, then $np' \epsilon$ {NS3′, NS13′},

if *np* = NP-2, then $np' \epsilon$ { N′, N-S3′},

if *np* = SNP, then $np' \epsilon$ { N′, NS3′, NS13′, D′, A′},

if *np* = PNP, then $np' \epsilon$ {N′, N-S3′, N-S13′, D′, A′},

if *np* = OBQ, then $np' \epsilon$ {D′, A′},

n ϵ {SN, PN} and n' correspondingly SN′ or PN′,

aux ϵ {DO, HV, BE} and aux' correspondingly DO′, HV′ or BE′

x, y = .?.?.?.? (arbitrary sequence up to length 4)

$ST_S =_{def}$ { [(x) {1 DET+ADJ, 2 DET+N, 3 NOM+FV}] }

DET+ADJ: (n' x) (ADJ) $\Rightarrow$ (*n* x) {4 DET+ADJ, 5 DET+N}

DET+N: (n' x) (*n*) $\Rightarrow$ (x) {6 NOM+FV, 7 FV+MAIN}

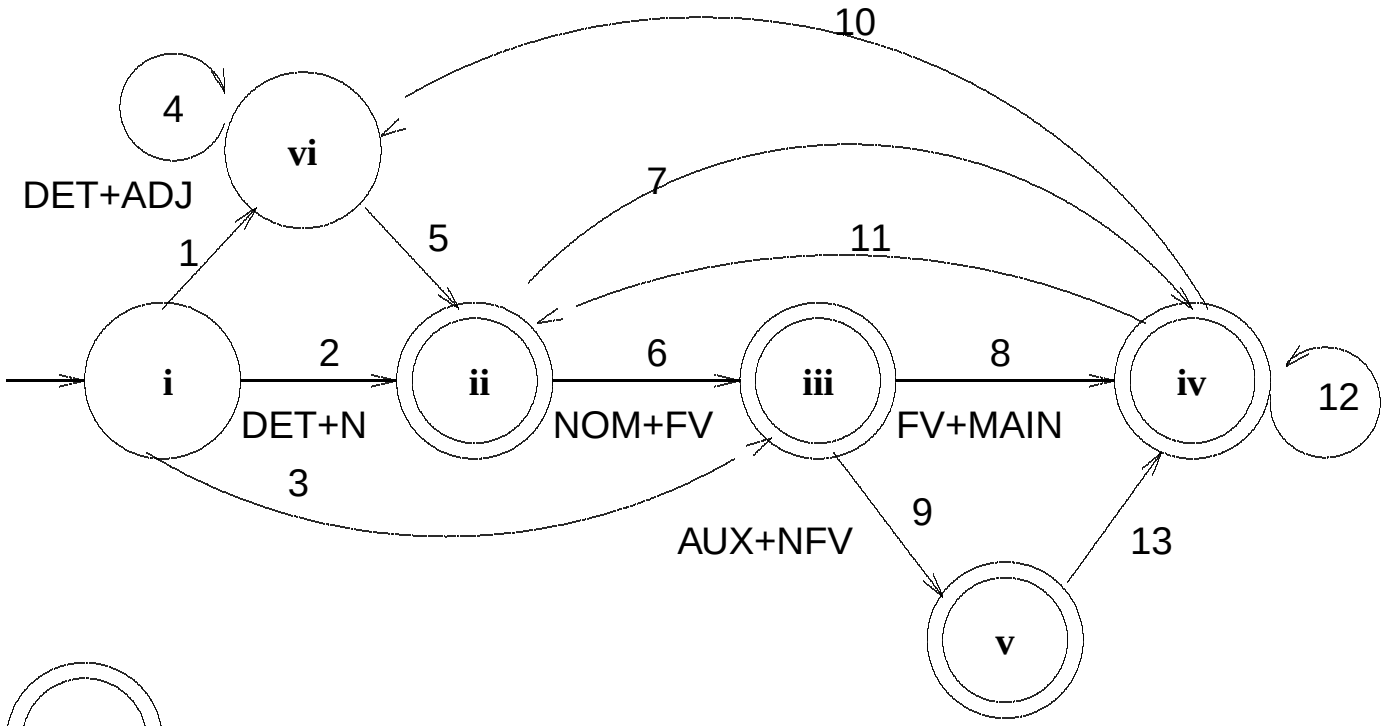
NOM+FV: (*np*) (np' x V) $\Rightarrow$ (x V) {8 FV+MAIN, 9 AUX+NFV}

FV+MAIN: (np' x V) (y *np*) $\Rightarrow$ (y x V) {10 DET+ADJ, 11 DET+N, 12 FV+MAIN}

AUX+NFV: (aux' V) (x *aux*) $\Rightarrow$ (x V) {13 FV+MAIN}

$ST_F =_{def}$ { [(V) rp_{nom+fv}], [(V) $rp_{aux+nfv}$], [(V) $rp_{fv+main}$], [(V) rp_{det+n}]}

17.4.2 The finite state backbone of *LA-E2*



= possible final state

= not a possible final state

(ii)	2, 5, 11	DET+N
(iii)	3, 6	NOM+FV
(iv)	7, 8, 12, 13	FV+MAIN
(v)	9	AUX+NFV
(vi)	1, 4, 10	DET+ADJ

17.4.3 Specifying the transition numbers in the input

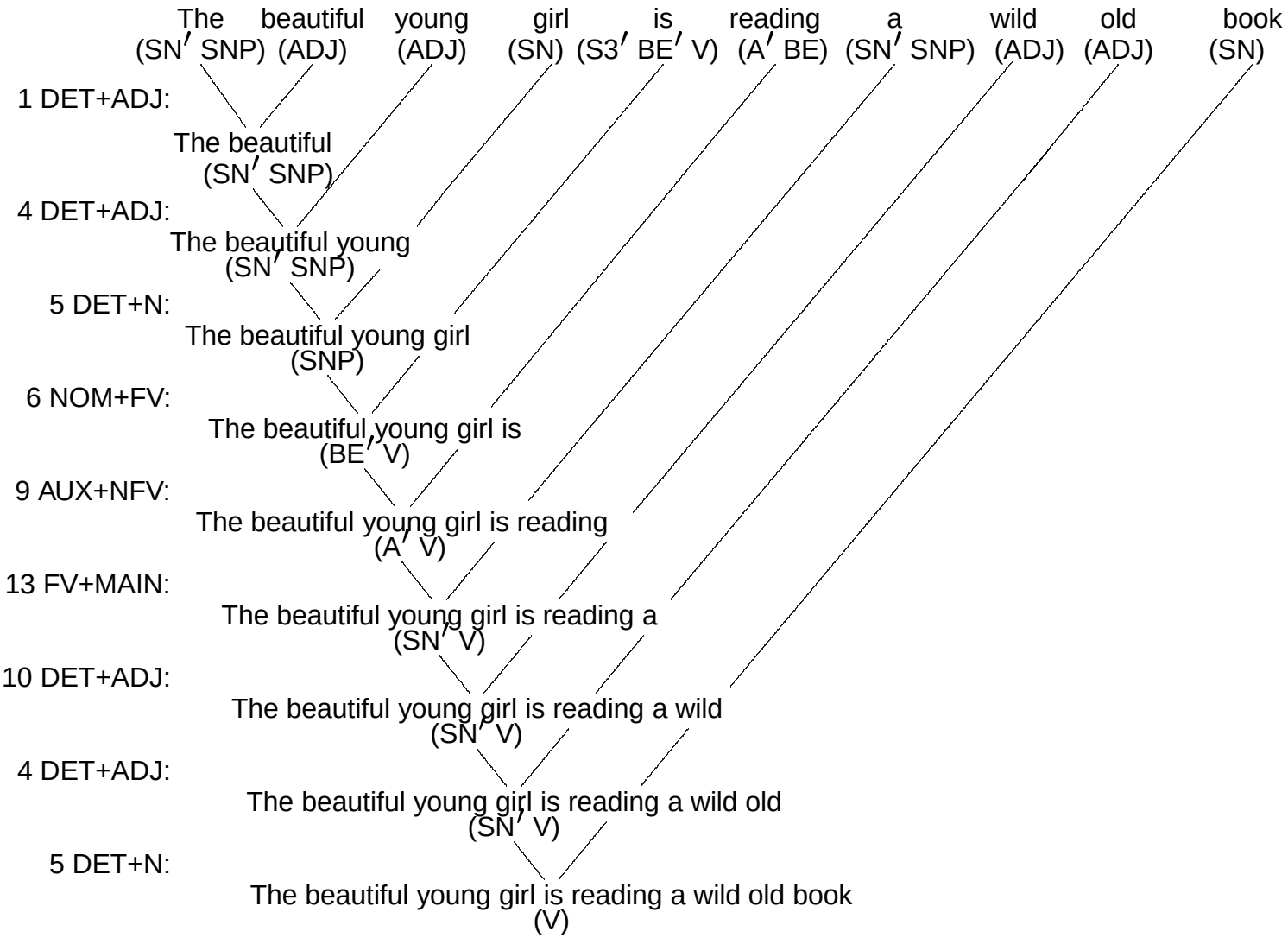
Peter 3 gave 8 Mary 12 a 11 book

the 1 beautiful 4 young 5 girl 6 is 9 reading 13 a 10 wild 4 old 5 book

the 2 boy 6 gave 8 the 11 girl 7 a 11 book

Peter 3 gave 8 Mary 12 Suzy

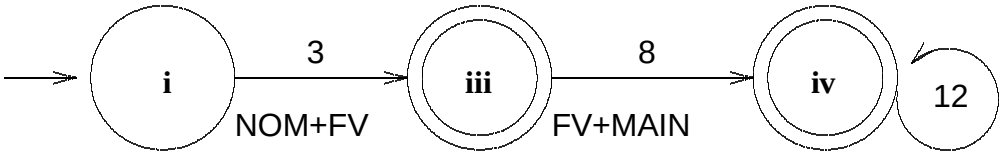
17.4.4 Syntactic analysis with transition numbers



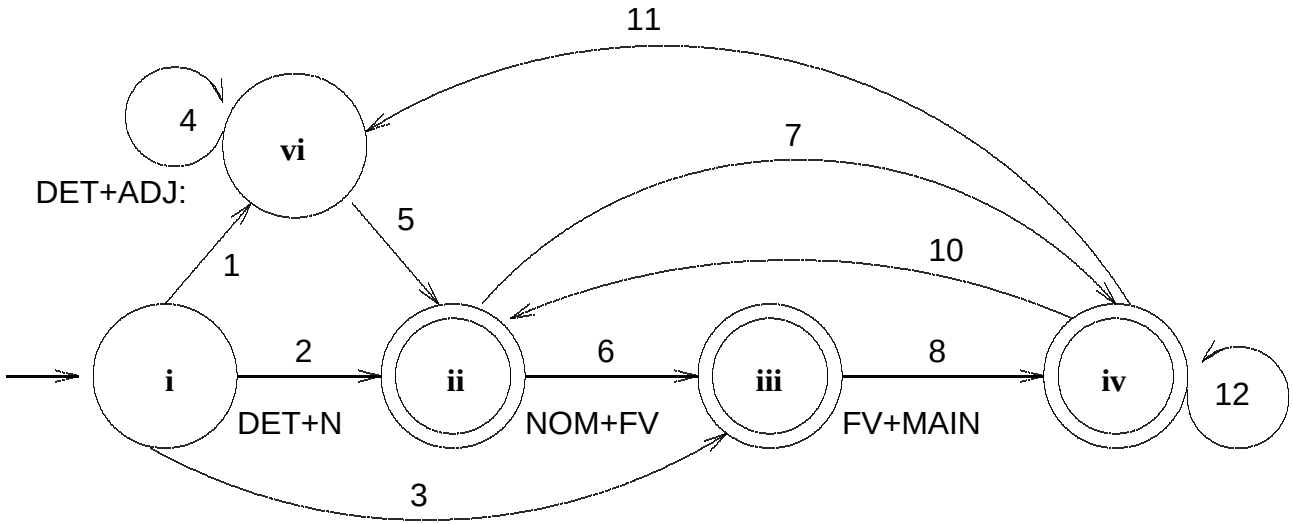
17.5 Yes/no-interrogatives (*LA-E3*) and grammatical perplexity

17.5.1 Expanding *LA-E1* to *LA-E1.5* handling complex NPs

LA-E1



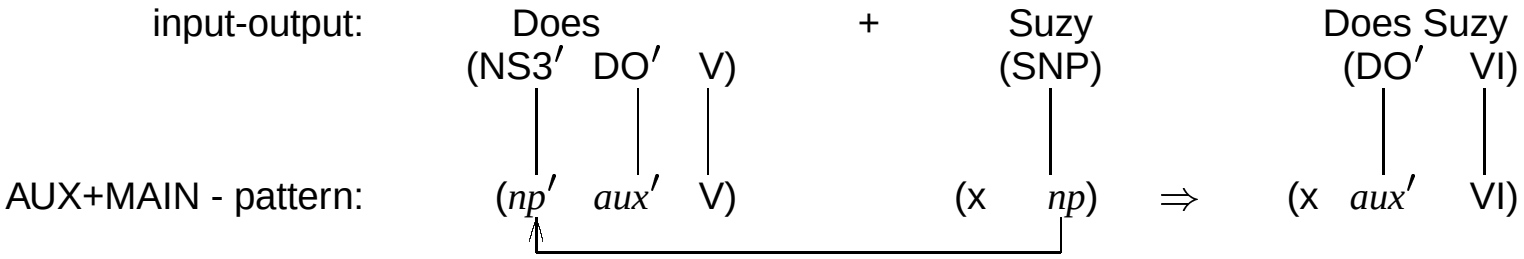
LA-E1.5



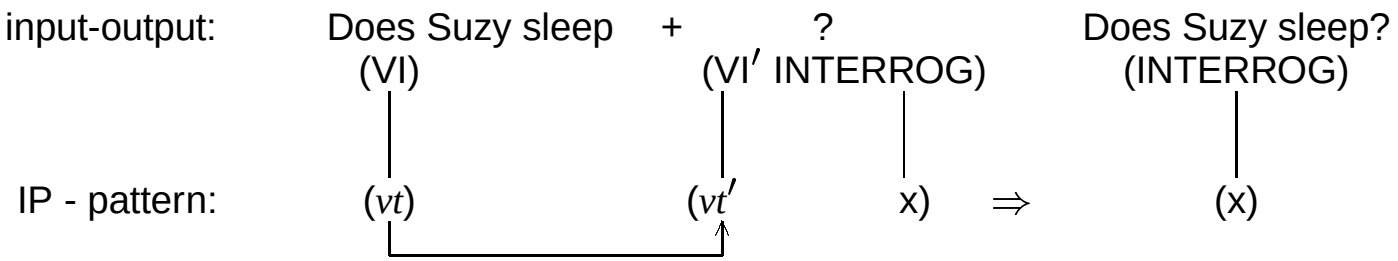
17.5.2 Comparing declaratives and Yes/No-Interrogatives

Suzy does like the book.	Does Suzy like the book?
Suzy has liked the book.	Has Suzy liked the book?
Suzy is liking the book.	Is Suzy liking the book?

17.5.3 Categorial operation of AUX+MAIN



17.5.4 Categorial operation of IP

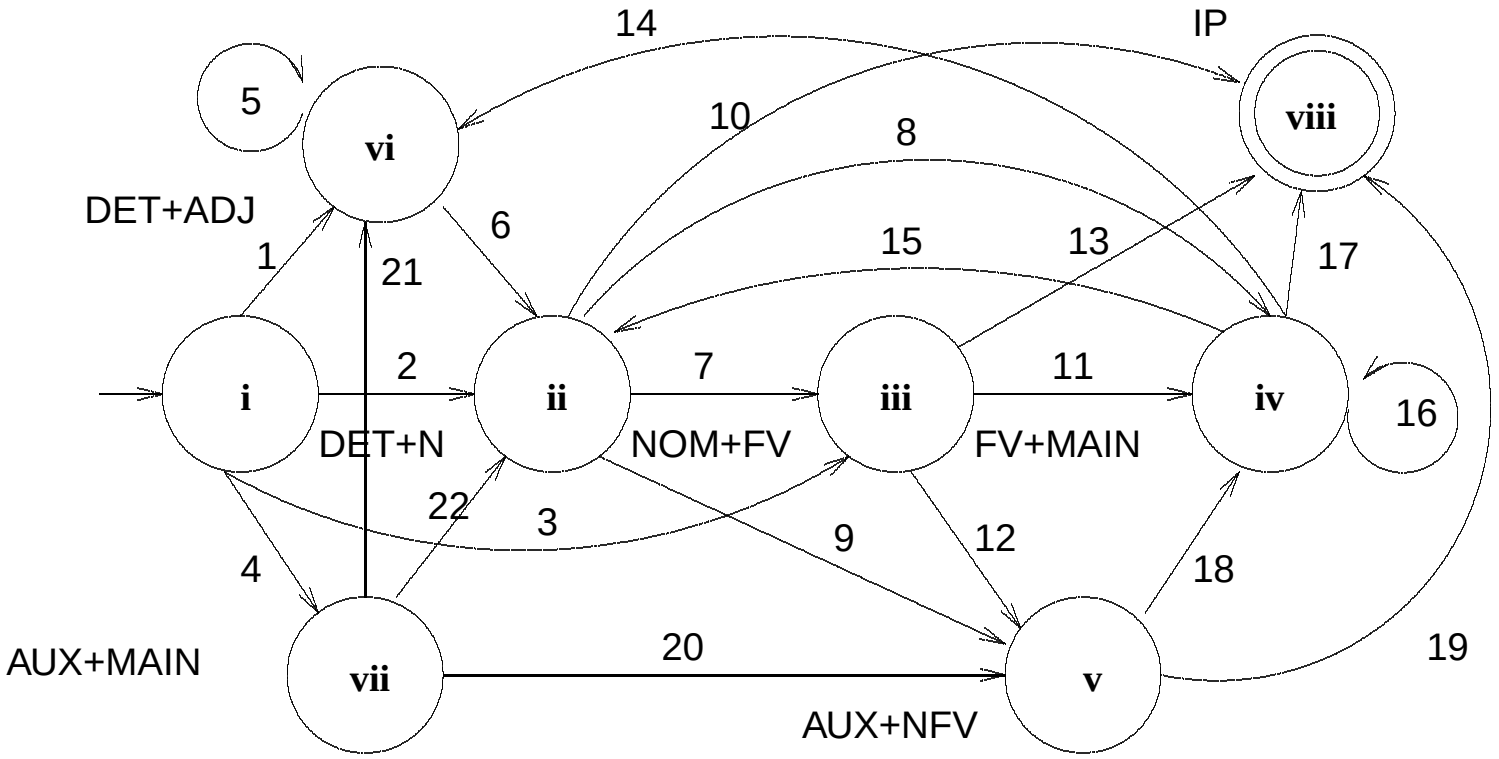


17.5.5 *LA-E3* for English yes/no-interrogatives

LX = LX of *LA-E2* plus {[. (V′ decl) *], [? (V′ interrog) *], [? (VI′ interrog)*]}
Variable definitions = that of *LA-E2* plus $vt \in$ {V, VI},

$ST_S =_{def}$ { [(x) {1 DET+ADJ, 2 DET+N, 3 NOM+FV, 4 AUX+MAIN}] }
DET+ADJ: (*n*′ x) (ADJ) ⇒ (*n*′ x) {5 DET+ADJ, 6 DET+N}
DET+N: (*n*′ x) (*n*) ⇒ (x) {7 NOM+FV, 8 FV+MAIN, 9 AUX+NFV, 10 IP}
NOM+FV: (*np*) (*np*′ x V) ⇒ (x V) {11 FV+MAIN, 12 AUX+NFV, 13 IP}
FV+MAIN: (*np*′ x V) (y *np*) ⇒ (y x V) {14 DET+ADJ, 15 DET+N, 16 FV+MAIN, 17 IP}
AUX+NFV: (*aux*′ V) (x *aux*) ⇒ (x V) {18 FV+MAIN, 19 IP}
AUX+MAIN:(*np*′ *aux*′ V) (x *np*) ⇒ (x *aux*′ VI) {20 AUX+NFV, 21 DET+ADJ, 22 DET+N}
IP: (*vt*) (*vt*′ x) ⇒ (x) {}
$ST_F =_{def}$ { [(decl) rp_{ip}], [(interrog) rp_{ip}]}

17.5.6 The finite state backbone of *LA-E3*



ii	2, 6, 15, 22	DET+N	v	9, 12, 20	AUX+NFV
iii	3, 7	NOM+FV	vi	1, 5, 14, 21	DET+ADJ
iv	8, 11, 16, 18	FV+MAIN	vii	4	AUX+MAIN
			viii	10, 13, 17, 19	IP

17.5.7 Perplexity

> Perplexity is, crudely speaking, a measure of the size of the set of words from which the next word is chosen given that we observe the history of the spoken words.
>
> S. Roukos 1995