Let's write a grammar for r.e. in which · and + are right associative and the precedence of the operators are * then · then |

$E \to \overset{1}{T} + E \mid \overset{2}{T}$

$T \to \overset{3}{F} \cdot T \mid \overset{4}{F}$

$F \to \overset{5}{H} * \mid \overset{6}{H}$

$H \to \overset{7}{a} \mid \overset{8}{b} \mid \overset{9}{c} \mid \overset{10}{\_} \mid \overset{11}{(} E)$

$FIRST(H) = \{a, b, c, \_, (\}$

$FIRST(F) = FIRST(H) = FIRST(T) = FIRST(E)$

Not LL(1) because there can be conflicts; let's try to left-factorise

$E \to \overset{1}{T}\, E'$

$E' \to \overset{2}{+}\, E \mid \overset{3}{\varepsilon}$

$T \to \overset{4}{F}\, T'$

$T' \to \overset{5}{\cdot}\, T \mid \overset{6}{\varepsilon}$

$F \to \overset{7}{H}\, F'$

$F' \to \overset{8}{*} \mid \overset{9}{\varepsilon}$

$H \to \overset{10}{a} \mid \overset{11}{b} \mid \overset{12}{c} \mid \overset{13}{\_} \mid \overset{14}{(}\, E)$

$FIRST(H) = \{a, b, c, \_, (\}$

$FIRST(F') = \{*, \varepsilon\}$

$FIRST(F) = FIRST(H) = \{a, b, c, \_, (\}$

$FIRST(T') = \{\cdot, \varepsilon\}$

$FIRST(T) = \{a, b, c, \_, (\}$

$FIRST(E') = \{+, \varepsilon\}$

$FIRST(E) = \{a, b, c, \_, (\}$

FOLLOW(E) = { $,) }

FOLLOW(E') = { $,) }

FOLLOW(T) = { +, $,) } = FOLLOW(T')

FOLLOW(F) = { ·, +, $,) } = FOLLOW(F')

FOLLOW(H) = { *, ·, +, $,) }

	a	b	c	_	*	·	+	(	)	$
E	1	1	1	1				1		
E'							2		3	3
T	4	4	4	4				4		
T'						5	6		6	6
F	7	7	7	7				7		
F'					8	9	9		9	9
H	10	11	12	13				14		

The grammar is LL(1)

$E \to T \quad \{ E'.n = T.t \} \quad E' \quad \{ E.t = E'.t \}$

$E' \to + E \quad \{ E'.t = makeN('+', E'.n, E.t) \}$

$E' \to \varepsilon \quad \{ E'.t = E'.n \}$

$T \to F \quad \{ T'.n = F.t \} \quad T' \quad \{ T.t = T'.t \}$

$T' \to \cdot T \quad \{ T'.t = makeN('\cdot', T'.n, T.t) \}$

$T' \to \varepsilon \quad \{ T'.t = T'.n \}$

$F \to H \quad \{ F'.n = H.t \} \quad F' \quad \{ F.t = F'.t \}$

$F' \to * \quad \{ F'.t = makeUN('*', F'.n) \}$

$F' \to \varepsilon \quad \{ F'.t = F'.n \}$

$H \to a \mid b \mid c \mid \_ \quad \{ H.t = makeL('a') \}$ (b-...)

$H \to (E) \quad \{ H.t = E.t \}$

makeN : BOperator × Node × Node → Node

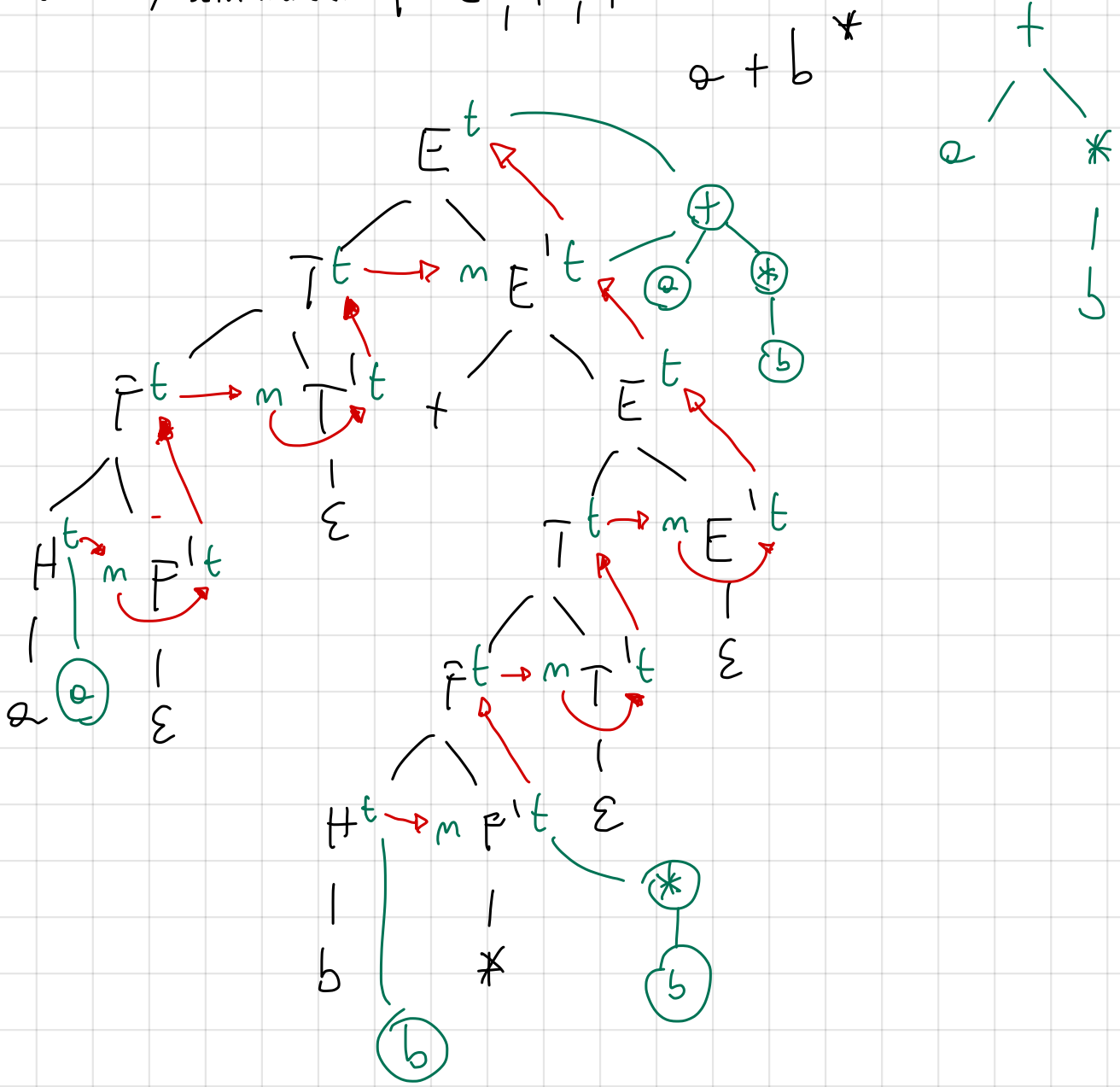
makeUN : UOperator × Node → Node

makeL : $\{a, b, c, \_\}$ → Node

Attributes

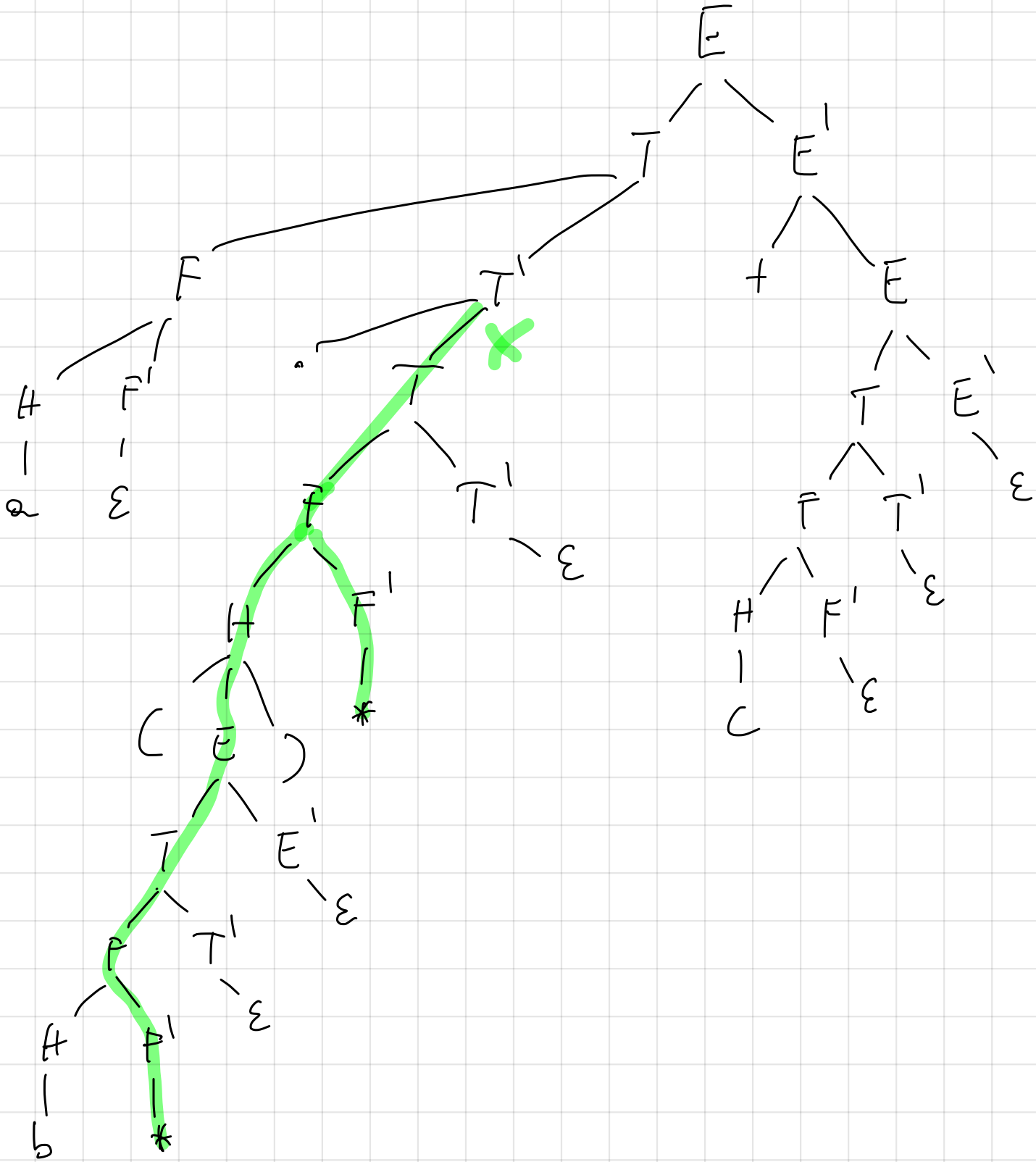
t : Node , synthesised for all the symbols

n : Node , inherited for E', T', F'



s : boolean "stored", synthesised, for all symbo

$a(b^*)^* + c$



$(a + b^*)^* + c$