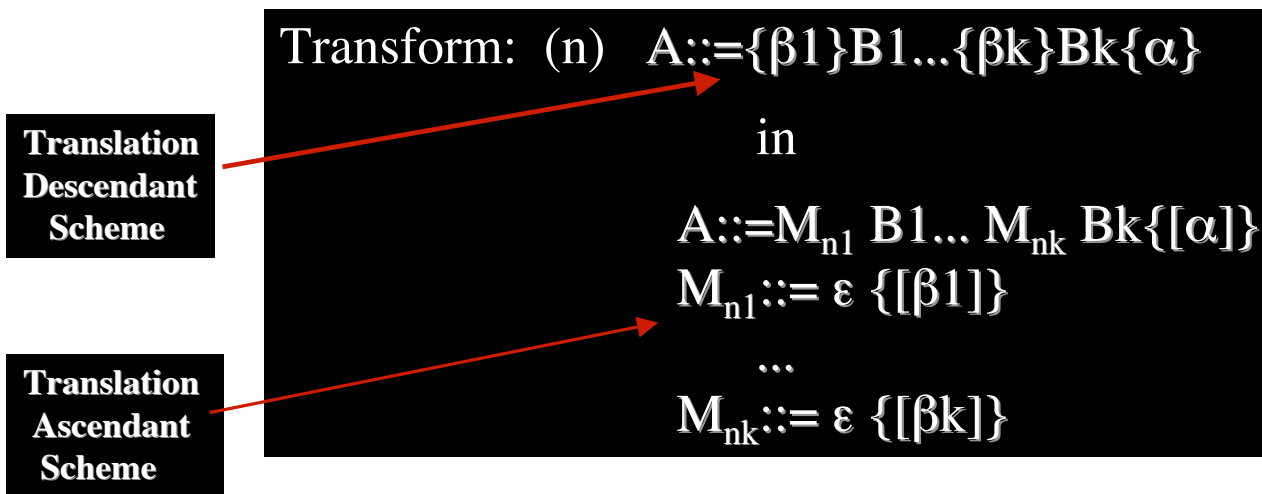


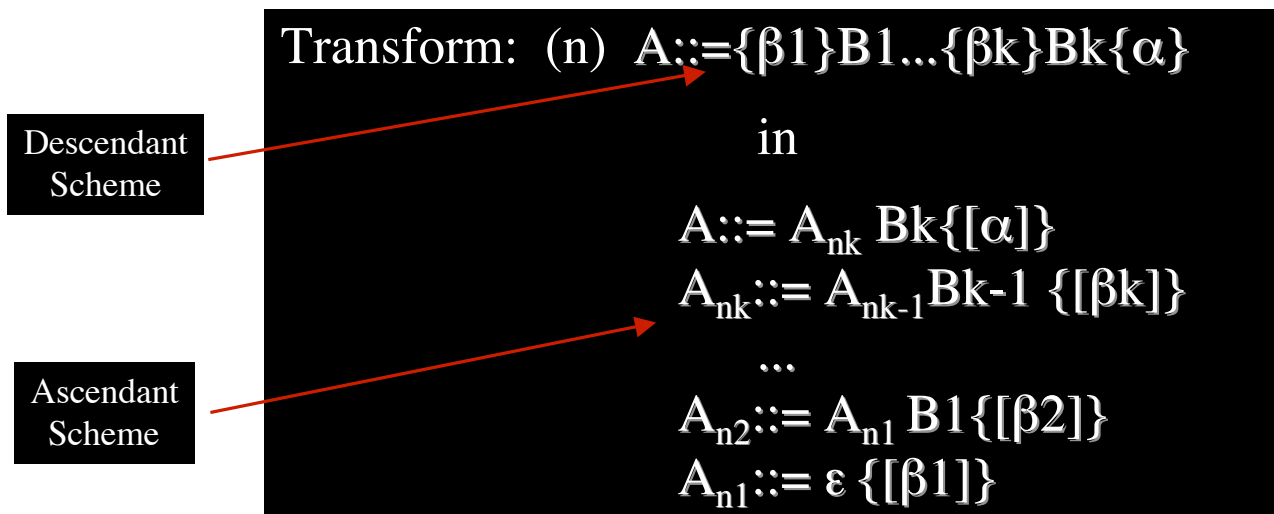
L-attributed Bottom-up Transformations: Markers



Inner Actions of the descendant schemes are transformed into final actions of ε -productions that are introduced by the Markers.

One **Marker uniquely identifies the position**, inside a production, and allows to handle: *inherited attributes* of a symbol as *synthesized attributes* of a marker

L-attributed Bottom-up Transformations: Factorization

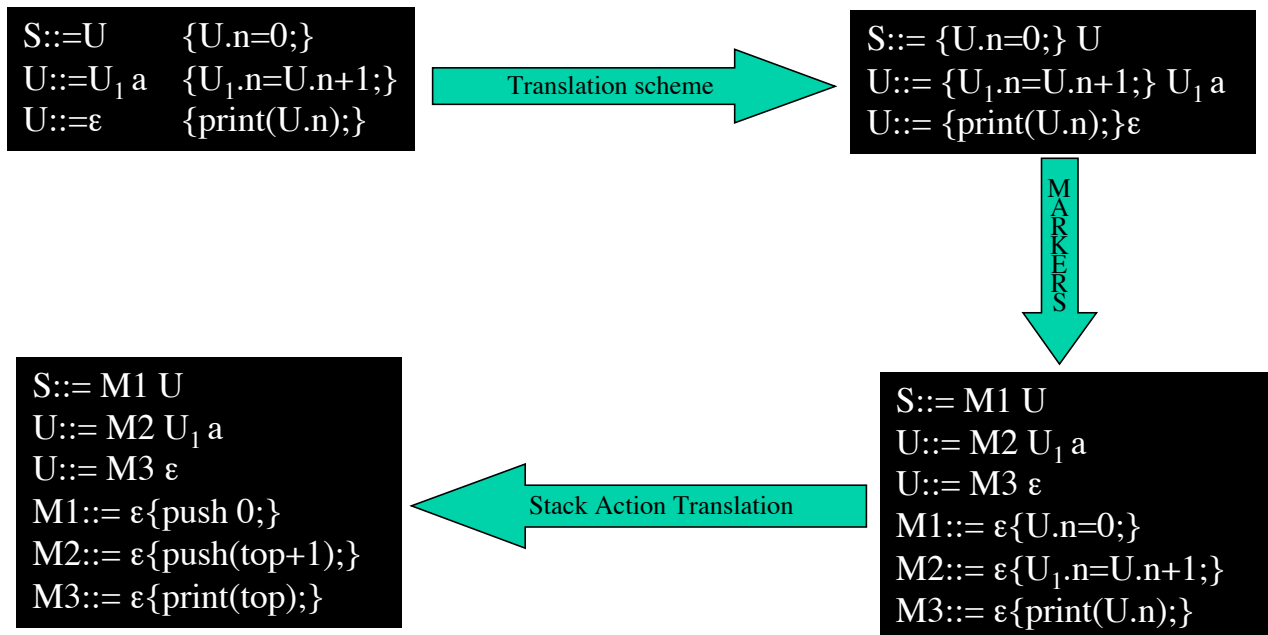


Inner Actions of the descendant schemes are transformed into final actions of productions of the new added grammaticals that are as many as the positions inside the production.

The new symbol A_{nj} **uniquely identifies the j-th position**, inside n-th production of A, and allows to handle: *inherited attributes* of a symbol as *synthesized attributes* of new symbol

Marker Based Transformation

How do actions have to be changed?

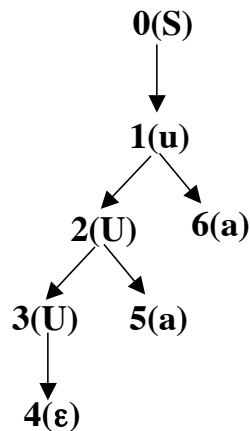


Marker Based Transformation

How do Parse Trees change?

```

S ::= U      {U.n=0;}
U ::= U1 a  {U1.n=U.n+1;}
U ::= ε      {print(U.n);}
    
```

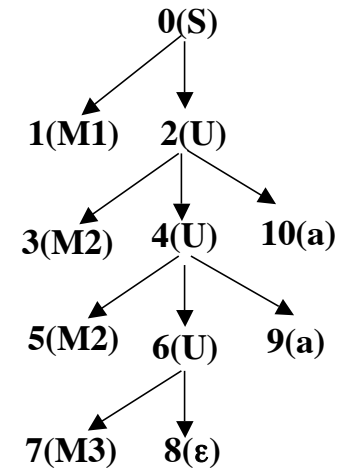


4->3->5->2->6->1->0

How does depth-first tree visit change (postorder)

```

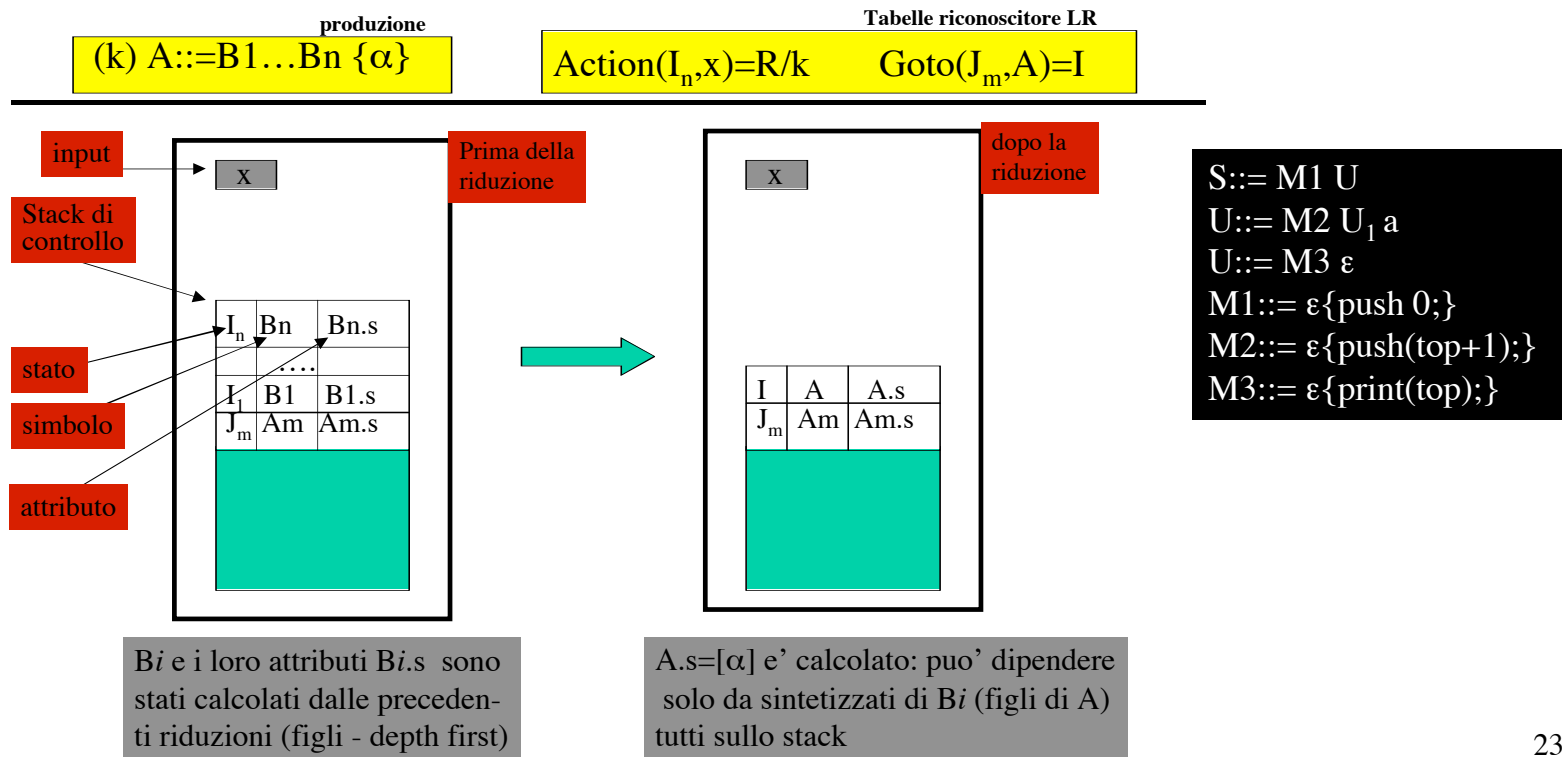
S ::= M1 U
U ::= M2 U1 a
U ::= M3 ε
M1 ::= ε {push 0;}
M2 ::= ε {push(top+1);}
M3 ::= ε {print(top);}
    
```



1->3->5->7->8->6->9->4->10->2->0

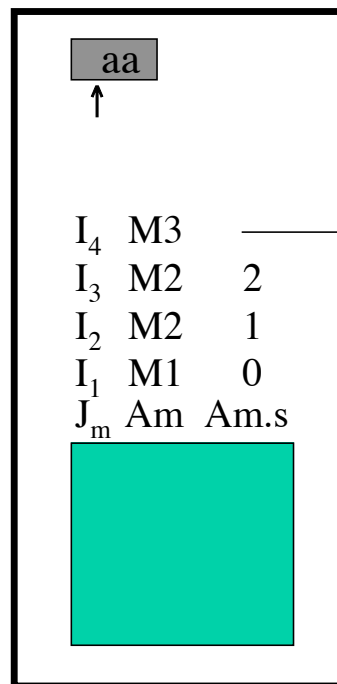
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Marker Based Transformation Attribute Evaluation -1



Marker Based Transformation

Attribute Evaluation -2



```

S ::= M1 U
U ::= M2 U1 a
U ::= M3 ε
M1 ::= ε {push 0;}
M2 ::= ε {push(top+1);}
M3 ::= ε {print(top);}
    
```

In this case, evaluation cannot behave in this way because the new grammar is not more LR(1)

This is why Factorization may be considered a better alternative to the use of Markers.

Oblivious Evaluators Implementation

- **Top-down:**
 - Translation Invariants
 - Translation of actions, α , containing attributes in actions on I/S stack positions
- **Bottom-up:**
 - Translation Invariants
 - Translation of actions, α , containing attributes in actions on C stack positions

matters not covered

Analisi Statica