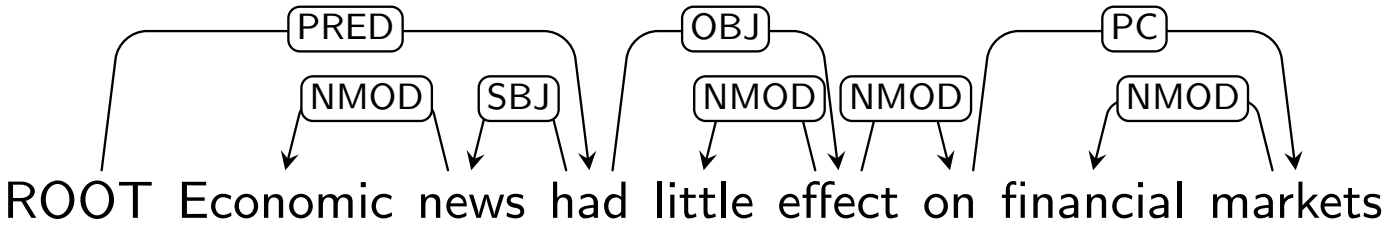
Extracting transitions from dependency trees

- Oracle: function from configurations to transitions
  given a dependency graph $G_d = (V_d, A_d)$ from the training set
- For the arc-standard transition system:

$$o(c = (\sigma, \beta, A)) = \begin{cases} \textsc{Left-Arc}_r & \text{if } (\beta[0], \sigma[0], r) \in A_d \\ \textsc{Right-Arc}_r & \text{if } (\sigma[0], \beta[0], r) \in A_d \text{ and, for all } w, r', \\ & \text{if } (\beta[0], w, r') \in A_d \text{ then } (\beta[0], w, r') \in A \\ \textsc{Shift}_r & \text{otherwise} \end{cases}$$

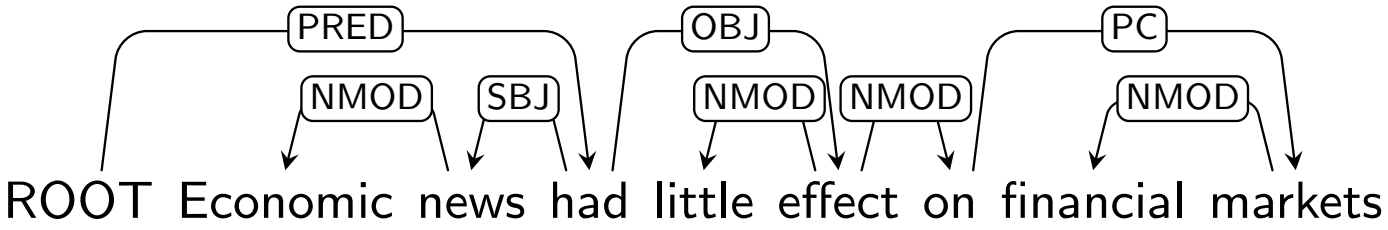
- Now we can construct a sequence of transitions
  for a sentence S_d and dependency graph $G_d = (V_d, A_d)$ in the training set:
  - Start with $c_0 = ([ROOT], S_d, \emptyset)$
  - Apply transition from oracle to get next configuration
  - . . . until terminal configuration $(\sigma, [], A_d)$ is reached

Example: getting configurations from dependency graph



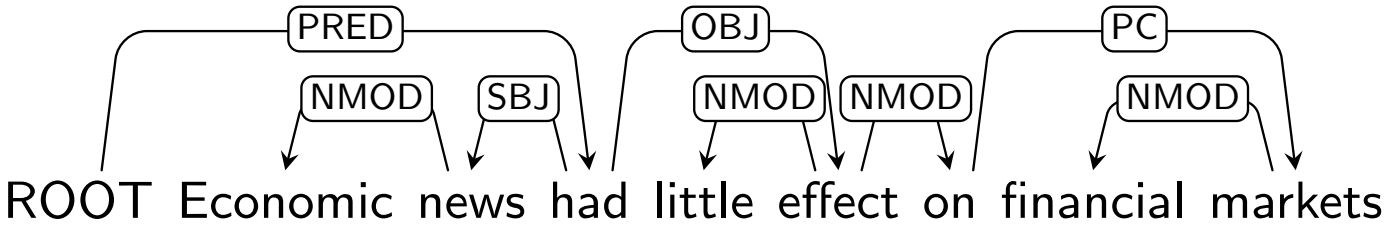
Transition	Stack	Input	Dependency
	[ROOT],	[Economic, . . .],	∅

Example: getting configurations from dependency graph



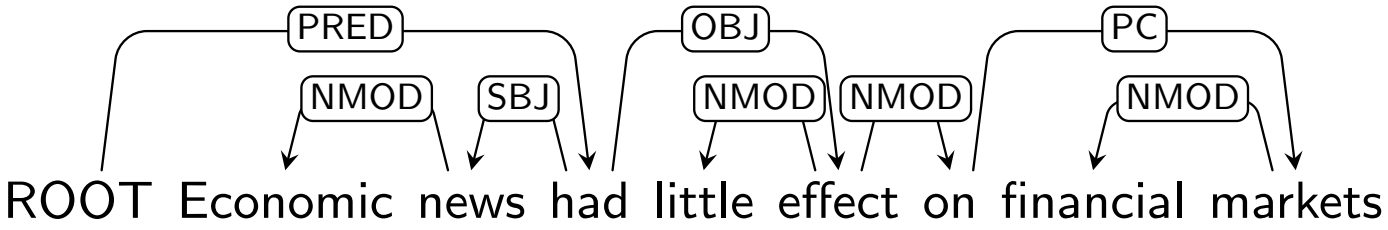
Transition	Stack	Input	Dependency
	[ROOT],	[Economic, . . .],	∅
SH	[ROOT, Economic],	[news, . . .],	∅

Example: getting configurations from dependency graph



Transition	Stack	Input	Dependency
	[ROOT],	[Economic, . . .],	$\emptyset$
SH	[ROOT, Economic],	[news, . . .],	$\emptyset$
LA_{NMOD}	[ROOT],	[news, . . .],	+(news, Economic, NMOD)

Example: getting configurations from dependency graph



Transition	Stack	Input	Dependency
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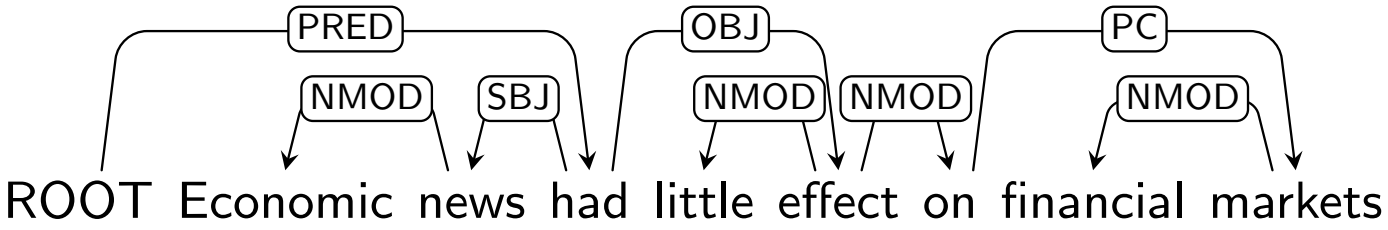
SH	[ROOT, Economic],	[news, . . .],	$\emptyset$
LA_{NMOD}	[ROOT],	[news, . . .],	+(news, Economic, NMOD)
SH	[ROOT, news],	[had, . . .],	

Example: getting configurations from dependency graph



Transition	Stack	Input	Dependency
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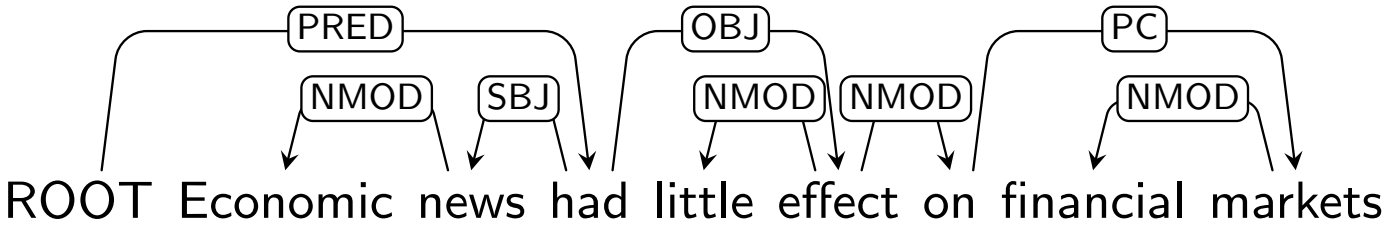
LA_{NMOD}	[ROOT],	[news, . . .],	+(news, Economic, NMOD)
SH	[ROOT, news],	[had, . . .],	
LA_{SBJ}	[ROOT],	[had, . . .],	+(had, news, SBJ)

Example: getting configurations from dependency graph



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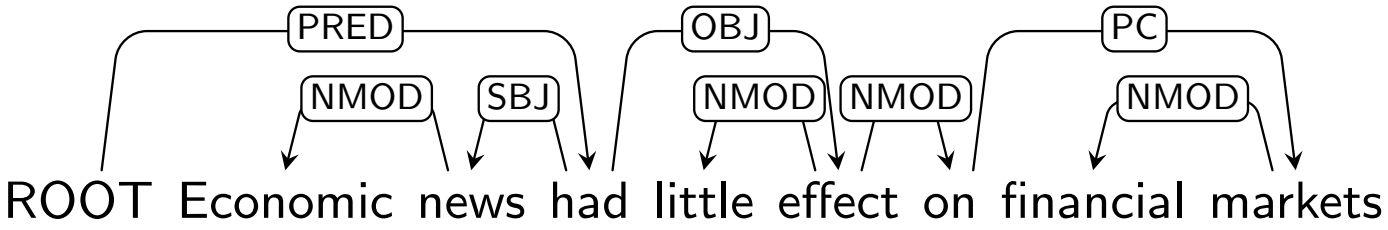
LA_{NMOD}	[ROOT],	[news, . . .],	+(news, Economic, NMOD)
SH	[ROOT, news],	[had, . . .],	
LA_{SBJ}	[ROOT],	[had, . . .],	+(had, news, SBJ)
SH	[ROOT, had],	[little, . . .]	

Example: getting configurations from dependency graph



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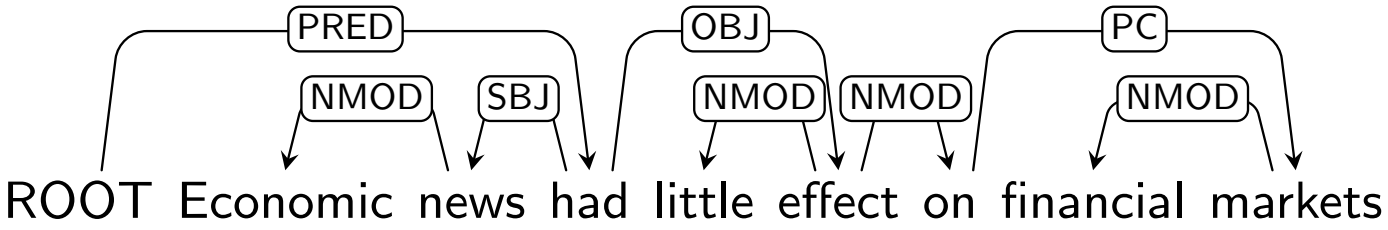
LA_{NMOD}	[ROOT],	[news, . . .],	+(news, Economic, NMOD)
SH	[ROOT, news],	[had, . . .],	
LA_{SBJ}	[ROOT],	[had, . . .],	+(had, news, SBJ)
SH	[ROOT, had],	[little, . . .]	
SH	[ROOT, had, little],	[effect, . . .]	

Example: getting configurations from dependency graph



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LA_{SBJ}	[ROOT],	[had, . . .],	+(had, news, SBJ)
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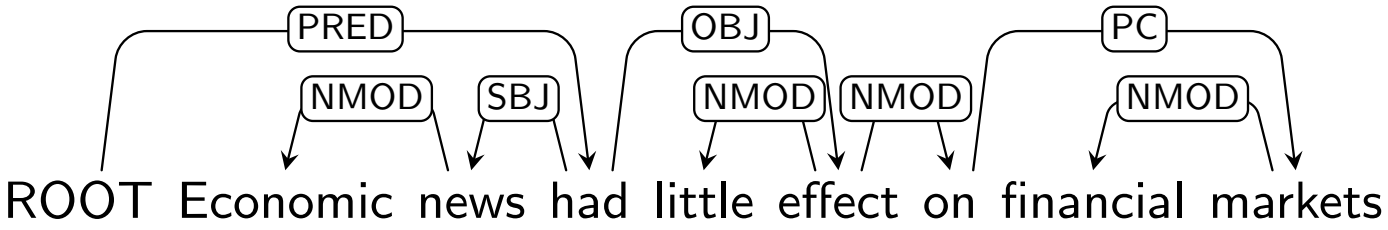
SH	[ROOT, had, little],	[effect, . . .]	
LA_{NMOD}	[ROOT, had],	[effect, . . .],	+(effect, little, NMOD)

Example: getting configurations from dependency graph



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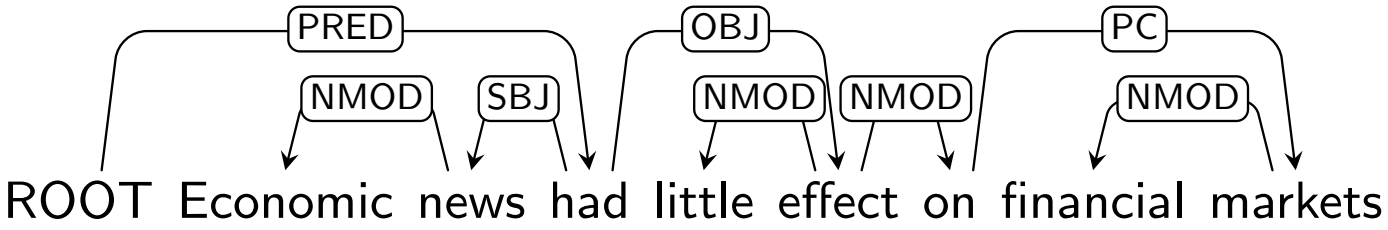
SH	[ROOT, news],	[had, . . .],	
LA_{SBJ}	[ROOT],	[had, . . .],	+(had, news, SBJ)
SH	[ROOT, had],	[little, . . .]	
SH	[ROOT, had, little],	[effect, . . .]	
LA_{NMOD}	[ROOT, had],	[effect, . . .],	+(effect, little, NMOD)
SH	[ROOT, had, effect],	[on, . . .],	

Example: getting configurations from dependency graph



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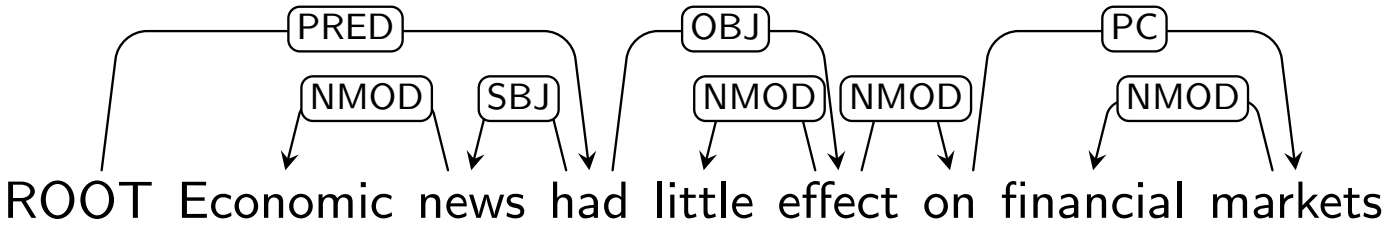
SH	[ROOT, had],	[little, . . .]	
SH	[ROOT, had, little],	[effect, . . .]	
LA_{NMOD}	[ROOT, had],	[effect, . . .],	+(effect, little, NMOD)
SH	[ROOT, had, effect],	[on, . . .],	
SH	[. . . , on],	[financial, markets],	

Example: getting configurations from dependency graph



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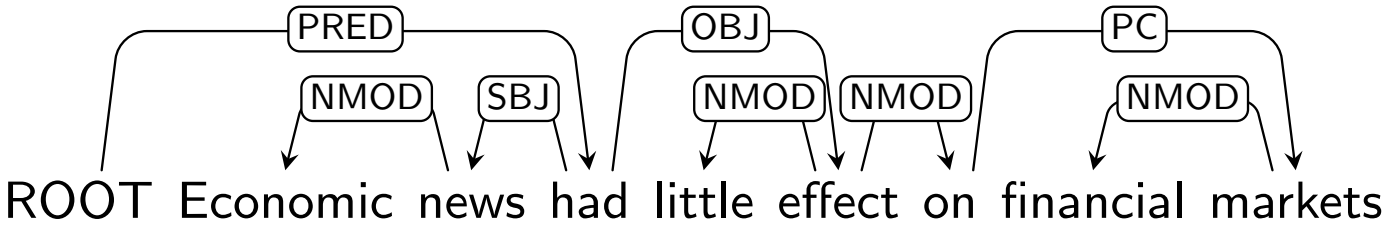
LA_{NMOD}	[ROOT, had],	[effect, . . .],	+(effect, little, NMOD)
SH	[ROOT, had, effect],	[on, . . .],	
SH	[. . . , on],	[financial, markets],	
SH	[. . . , on, financial],	[markets],	

Example: getting configurations from dependency graph



Transition	Stack	Input	Dependency
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LA_{NMOD}	[ROOT],	[news, . . .],	+(news, Economic, NMOD)
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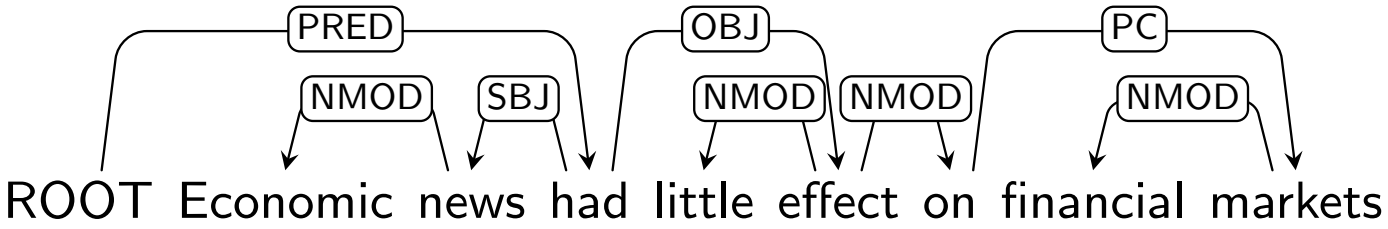
SH	[ROOT, had, little],	[effect, . . .]	
LA_{NMOD}	[ROOT, had],	[effect, . . .],	+(effect, little, NMOD)
SH	[ROOT, had, effect],	[on, . . .],	
SH	[. . . , on],	[financial, markets],	
SH	[. . . , on, financial],	[markets],	
LA_{NMOD}	[. . . , on],	[markets]	+(markets, financial, NMOD)

Example: getting configurations from dependency graph



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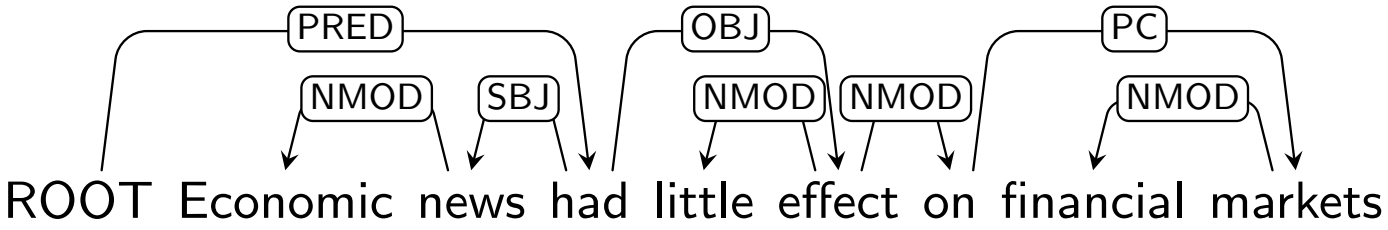
LA_{NMOD}	[ROOT],	[news, . . .],	+(news, Economic, NMOD)
SH	[ROOT, news],	[had, . . .],	
LA_{SBJ}	[ROOT],	[had, . . .],	+(had, news, SBJ)
SH	[ROOT, had],	[little, . . .]	
SH	[ROOT, had, little],	[effect, . . .]	
LA_{NMOD}	[ROOT, had],	[effect, . . .],	+(effect, little, NMOD)
SH	[ROOT, had, effect],	[on, . . .],	
SH	[. . . , on],	[financial, markets],	
SH	[. . . , on, financial],	[markets],	
LA_{NMOD}	[. . . , on],	[markets]	+(markets, financial, NMOD)
RA_{PC}	[ROOT, had, effect]	[on]	+(on, markets, PC)

Example: getting configurations from dependency graph



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LA_{NMOD}	[ROOT],	[news, . . .],	+(news, Economic, NMOD)
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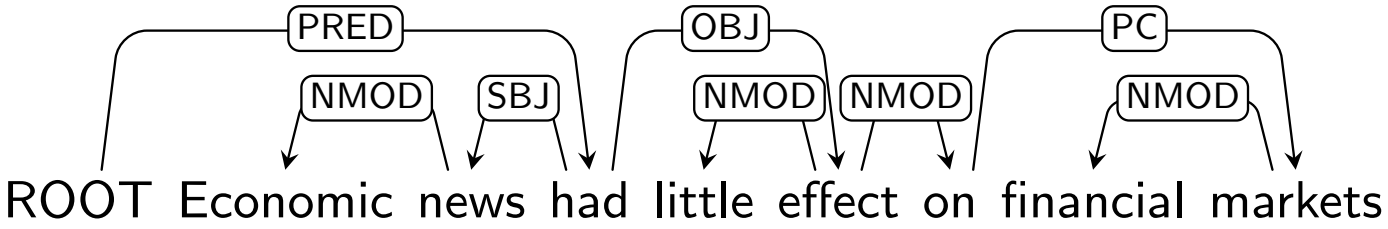
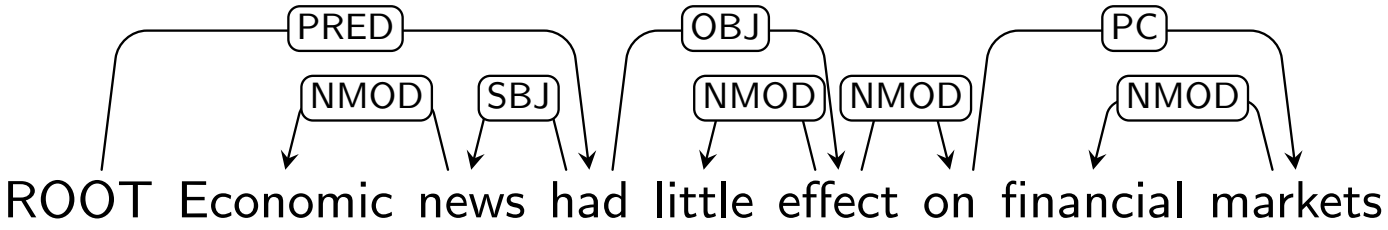
SH	[ROOT, had],	[little, . . .]	
SH	[ROOT, had, little],	[effect, . . .]	
LA_{NMOD}	[ROOT, had],	[effect, . . .],	+(effect, little, NMOD)
SH	[ROOT, had, effect],	[on, . . .],	
SH	[. . . , on],	[financial, markets],	
SH	[. . . , on, financial],	[markets],	
LA_{NMOD}	[. . . , on],	[markets]	+(markets, financial, NMOD)
RA_{PC}	[ROOT, had, effect]	[on]	+(on, markets, PC)
RA_{NMOD}	[ROOT, had]	[effect]	+(effect, on, NMOD)

Example: getting configurations from dependency graph (continued)



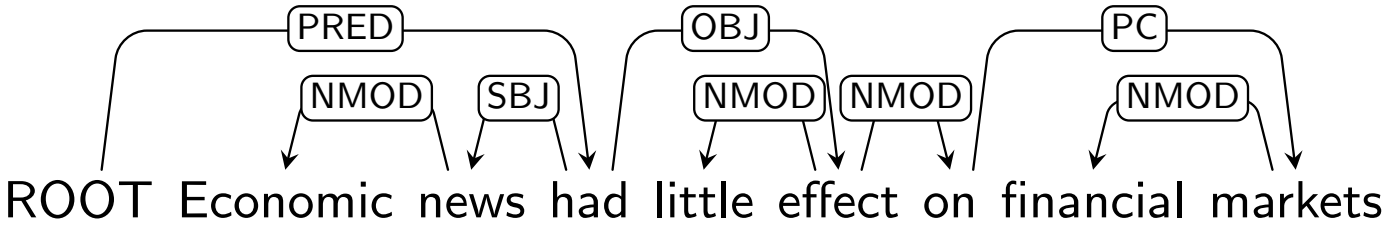
Transition	Stack	Input	Dependency
...			
SH	[ROOT, had, effect],	[on, ...],	
SH	[..., on],	[financial, markets],	
SH	[..., on, financial],	[markets],	
LA_{NMOD}	[..., on],	[markets]	+(markets, financial, NMOD)
RA_{PC}	[ROOT, had, effect]	[on]	+(on, markets, PC)
RA_{NMOD}	[ROOT, had]	[effect]	+(effect, on, NMOD)

Example: getting configurations from dependency graph (continued)



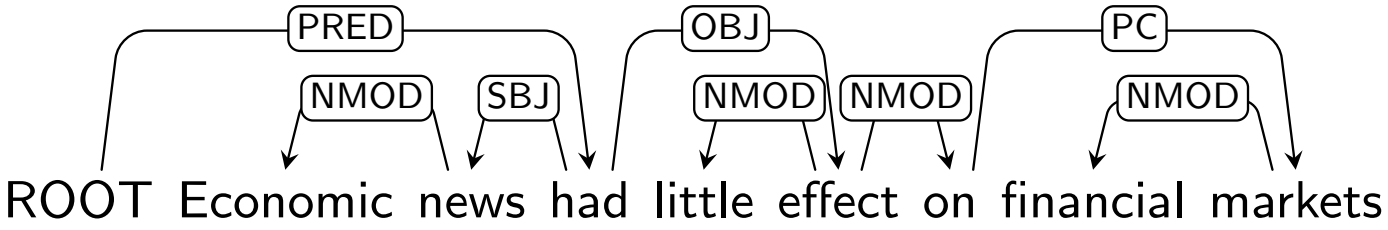
Transition	Stack	Input	Dependency
...			
SH	[ROOT, had, effect],	[on, ...],	
SH	[..., on],	[financial, markets],	
SH	[..., on, financial],	[markets],	
LA_{NMOD}	[..., on],	[markets]	+(markets, financial, NMOD)
RA_{PC}	[ROOT, had, effect]	[on]	+(on, markets, PC)
RA_{NMOD}	[ROOT, had]	[effect]	+(effect, on, NMOD)
RA_{OBJ}	[ROOT]	[had]	+(had, effect, OBJ)

Example: getting configurations from dependency graph (continued)



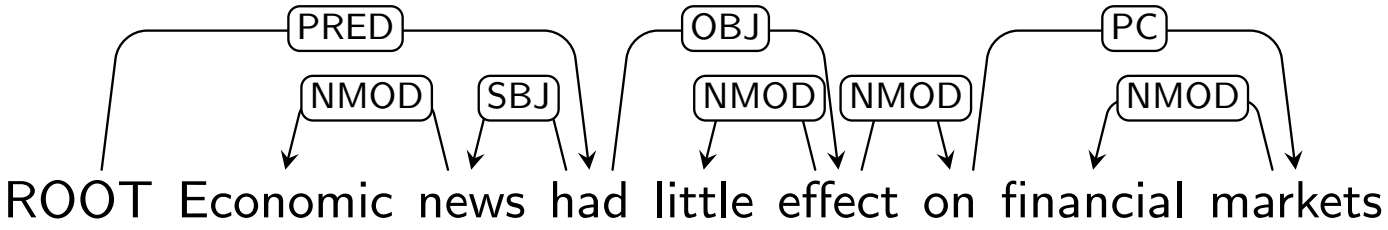
Transition	Stack	Input	Dependency
...			
SH	[ROOT, had, effect],	[on, ...],	
SH	[..., on],	[financial, markets],	
SH	[..., on, financial],	[markets],	
LA_{NMOD}	[..., on],	[markets]	+(markets, financial, NMOD)
RA_{PC}	[ROOT, had, effect]	[on]	+(on, markets, PC)
RA_{NMOD}	[ROOT, had]	[effect]	+(effect, on, NMOD)
RA_{OBJ}	[ROOT]	[had]	+(had, effect, OBJ)
RA_{PRED}	[]	[ROOT]	+(ROOT, had, PRED)

Example: getting configurations from dependency graph (continued)



Transition	Stack	Input	Dependency
...			
SH	[ROOT, had, effect],	[on, ...],	
SH	[..., on],	[financial, markets],	
SH	[..., on, financial],	[markets],	
LA_{NMOD}	[..., on],	[markets]	+(markets, financial, NMOD)
RA_{PC}	[ROOT, had, effect]	[on]	+(on, markets, PC)
RA_{NMOD}	[ROOT, had]	[effect]	+(effect, on, NMOD)
RA_{OBJ}	[ROOT]	[had]	+(had, effect, OBJ)
RA_{PRED}	[]	[ROOT]	+(ROOT, had, PRED)
SH	[ROOT]	[]	

Example: getting configurations from dependency graph (continued)



Transition	Stack	Input	Dependency
...			
SH	[ROOT, had, effect],	[on, ...],	
SH	[..., on],	[financial, markets],	
SH	[..., on, financial],	[markets],	
LA_{NMOD}	[..., on],	[markets]	+(markets, financial, NMOD)
RA_{PC}	[ROOT, had, effect]	[on]	+(on, markets, PC)
RA_{NMOD}	[ROOT, had]	[effect]	+(effect, on, NMOD)
RA_{OBJ}	[ROOT]	[had]	+(had, effect, OBJ)
RA_{PRED}	[]	[ROOT]	+(ROOT, had, PRED)
SH	[ROOT]	[]	

Now the buffer is empty $\rightarrow$ terminal configuration is reached