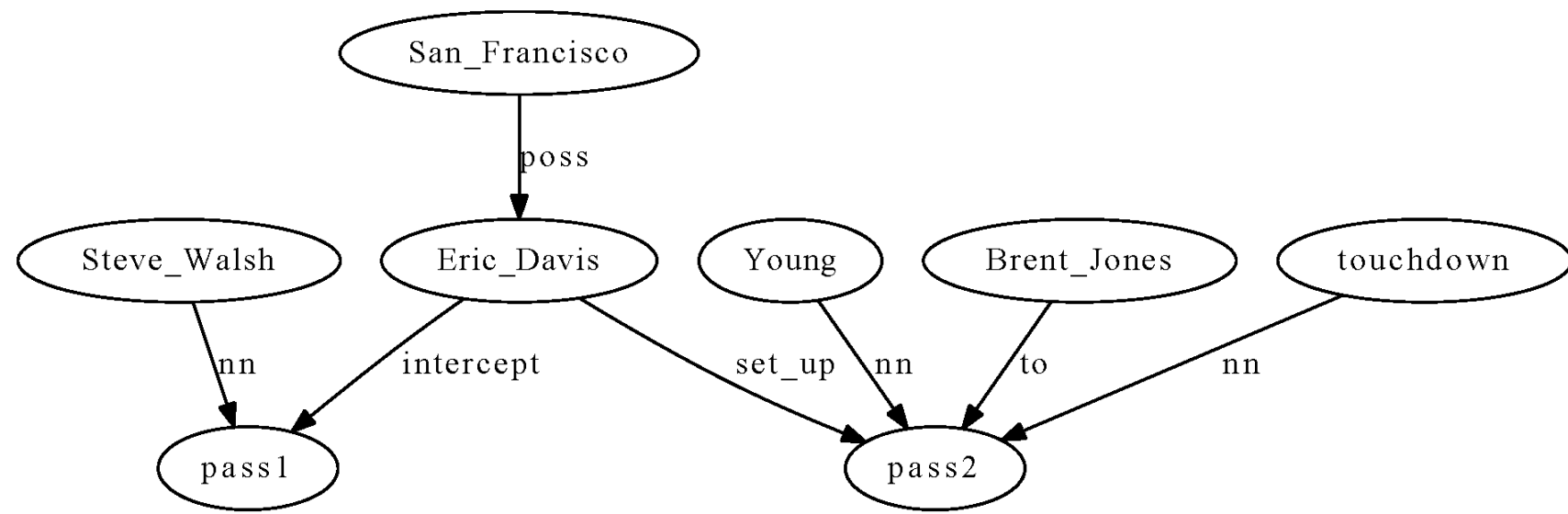


# Semantic Enrichment of Text with Background Knowledge

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San Francisco's Eric Davis intercepted a Steve Walsh pass on the next series to set up a seven-yard Young touchdown pass to Brent Jones.



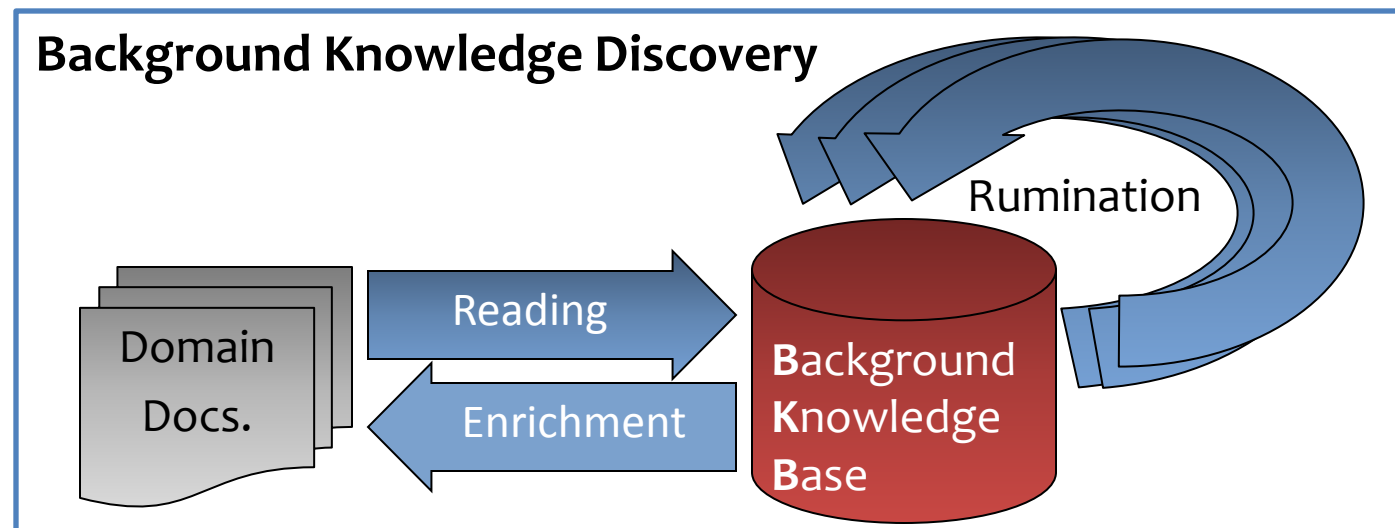
Implicit	(More) explicit
San Francisco's Eric Davis	Eric Davis plays on San Francisco
Eric Davis intercepted pass <sub>1</sub>	-
Steve Walsh pass <sub>1</sub>	Steve Walsh threw pass <sub>1</sub> Steve Walsh threw interception <sub>1</sub>
Young touchdown pass <sub>2</sub>	Young completed pass <sub>2</sub> for touchdown
touchdown pass <sub>2</sub> to Brent Jones	Brent Jones catch pass <sub>2</sub> for touchdown

## Objective

Make explicit implicit information  
 Unsupervised

## Why?

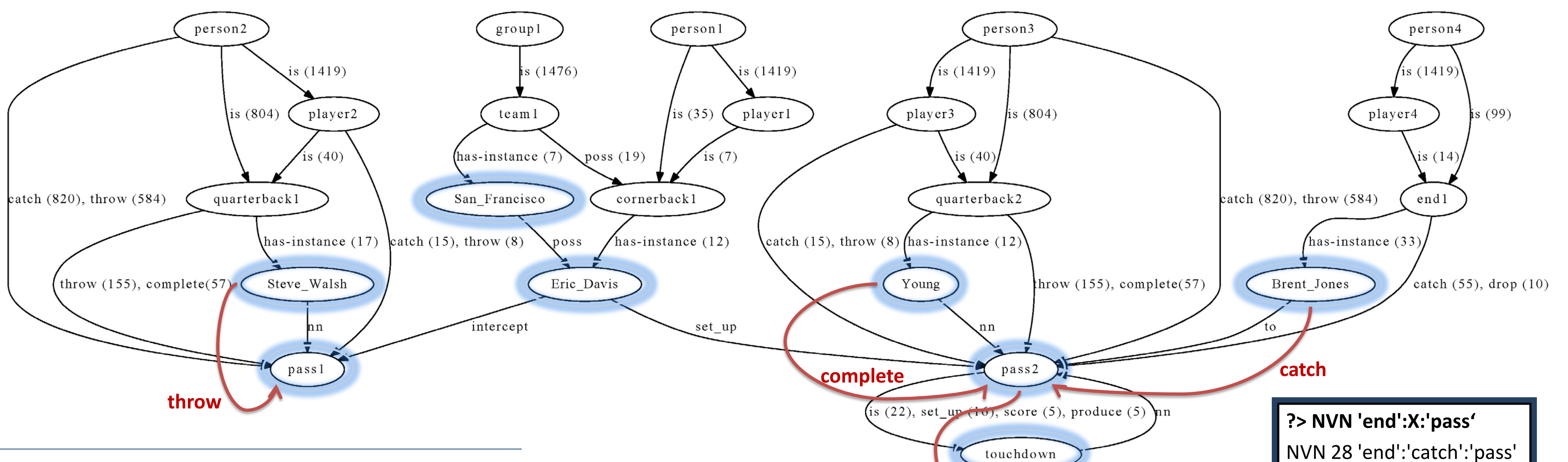
Establish coherent interpretation of text  
 Needed before reasoning



## Cycle

1. Reading of text collection
2. Rumination of BKB
3. Enrichment of collection texts
4. Repeat

## Semantic Enrichment



## Reading

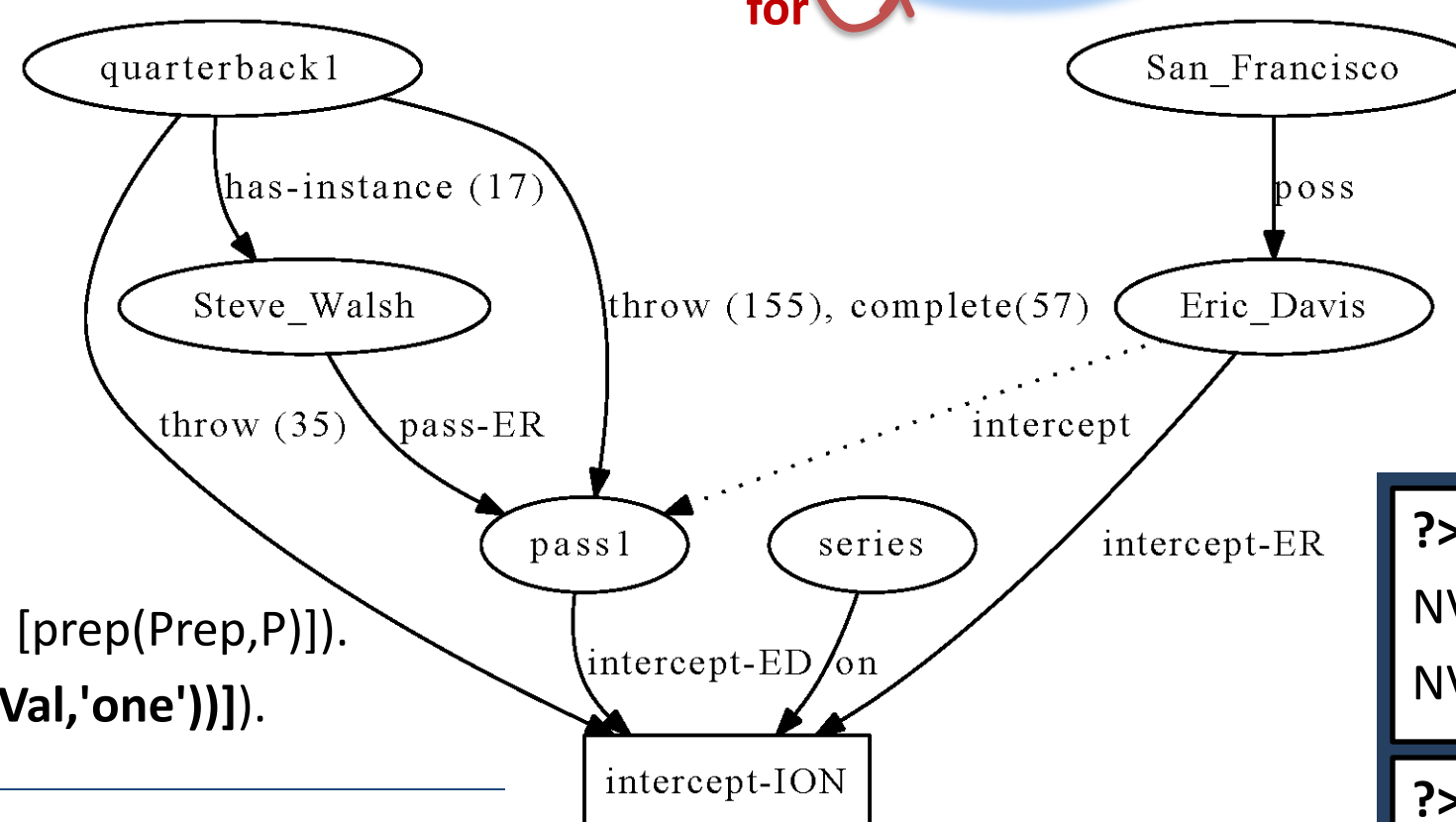
Patterns over dependency trees

## Pattern Definition Language

prop( Type, Form : DependencyConstraints : NodeConstraints ).

## Examples

prop('NV', [N,V] : [V:N:nsbj, not(V:.'dobj')]) : [verb(V)].  
 prop('NVNPN', [N1,V,N2,P,N3] : [V:N2:'dobj', V:N3:Prep, subj(V,N1)]) : [prep(Prep,P)].  
 prop('N-has-value-C', [N,Val] : [N:Val:\_] : [nn(N), cd(Val), not(lemma(Val,'one'))]).



?> NVN 'end':X:'pass'  
 NVN 28 'end':.'catch':.'pass'  
 NVN 6 'end':.'drop':.'pass'

?> NVN 'NNP':X:'pass'  
 NVN 2241 'NNP':.'catch':.'pass'  
 NVN 2106 'NNP':.'throw':.'pass'  
 NVN 844 'NNP':.'complete':.'pass'  
 NVN 434 'NNP':.'intercept':.'pass'

?> NVN 'quarterback':X:'pass'  
 NVN 98 'quarterback':.'throw':.'pass'  
 NVN 27 'quarterback':.'complete':.'pass'

?> NVN X:'intercept':.'pass'  
 NVN 75 'person':.'intercept':.'pass'  
 NVN 14 'cornerback':.'intercept':.'pass'  
 NVN 11 'defense':.'intercept':.'pass'  
 NVN 8 'safety':.'intercept':.'pass'

## Background Knowledge Base

?> NN NNP:'pass'  
 NN 24 'Marino':.'pass'  
 NN 17 'Kelly':.'pass'  
 NN 15 'Elway':.'pass'

?> NPN 'pass':X:'quarterback'  
 NPN 23 'pass':.'from':.'quarterback'  
 NPN 14 'pass':.'by':.'quarterback'

?> NPN 'pass':X:'NNP'  
 NPN 1305 'pass':.'to':.'NNP'  
 NPN 1085 'pass':.'from':.'NNP'  
 NPN 147 'pass':.'by':.'NNP'  
 NPN 144 'pass':.'for':.'NNP'

?> NVNPN 'NNP':X:'pass':Y:Z  
 NVNPN 758 'NNP':.'throw':.'pass':.'to':.'NNP'  
 NVNPN 562 'NNP':.'catch':.'pass':.'for':.'yard'  
 NVNPN 338 'NNP':.'complete':.'pass':.'to':.'NNP'  
 NVNPN 255 'NNP':.'catch':.'pass':.'from':.'NNP'

?> X:has-instance:'Eric\_Davis'  
 12 'cornerback':has-instance:'Eric\_Davis'

?> X:has-instance:'Steve-Walsh'  
 17 'quarterback':has-instance:'Steve-Walsh'

?> X:has-instance:'Marino'  
 20 'quarterback':has-instance:'Marino'  
 6 'passer':has-instance:'Marino'  
 4 'leader':has-instance:'Marino'  
 3 'veteran':has-instance:'Marino'  
 2 'player':has-instance:'Marino'

?> 'team':has-instance:X  
 192 'team':has-instance:'Jets'  
 189 'team':has-instance:'Giants'  
 43 'team':has-instance:'Eagles'  
 40 'team':has-instance:'Bills'  
 36 'team':has-instance:'Colts'

?> NPN 'pass':X:'touchdown'  
 NPN 712 'pass':.'for':.'touchdown'  
 NPN 24 'pass':.'include':.'touchdown'

?> NVNPN 'NNP':X:'pass':Y:'touchdown'  
 NVNPN 189 'NNP':.'catch':.'pass':.'for':.'touchdown'  
 NVNPN 26 'NNP':.'complete':.'pass':.'for':.'touchdown'