"Using inheritance and coreness sets to improve a verb lexicon harvested from FrameNet"

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Motivations for Role Set Reduction

Lexical Resource Comparison

	Frames/ Classes	Sub-frames/ Sub-classes	Role Labels
FrameNet	362	9,180	440
VerbNet	270	206	30
TRIPS	284	--	48

Lexical Resource Comparison

	Frames/ Classes	Sub-frames/ Sub-classes	Role Labels
FrameNet	362	9,180	440
VerbNet	270	206	30
TRIPS	284	--	48

- Disambiguation
- Linking syntax and semantics

Composition of FrameNet Frames

Commerce_buy

Commerce_buy

buy (v), buyer (n), purchase_act (n), purchase (v), purchaser (n)

$$\begin{bmatrix} \text{ORTH} & \langle purchase \rangle \\ \text{CAT} & \text{V} \\ \text{TYPE} & \text{Commerce\_buy} \\ \text{ARGS} & \left\langle \begin{bmatrix} \text{CAT} & \text{NP} \\ \text{ROLE} & \text{Buyer} \end{bmatrix}, \begin{bmatrix} \text{CAT} & \text{Obj} \\ \text{ROLE} & \text{Goods} \end{bmatrix} \right\rangle \end{bmatrix}$$

Commerce_buy

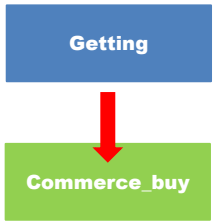
buy (v), buyer (n), purchase_act (n), purchase (v), purchaser (n)

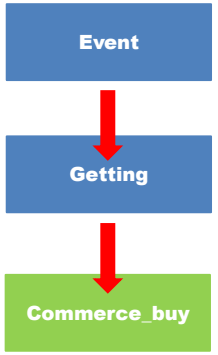
$$\begin{bmatrix} \text{ORTH} & \langle purchase \rangle \\ \text{CAT} & \text{V} \\ \text{TYPE} & \text{Commerce\_buy} \\ \text{ARGS} & \left\langle \begin{bmatrix} \text{CAT} & \text{NP} \\ \text{ROLE} & \text{Buyer} \end{bmatrix}, \begin{bmatrix} \text{CAT} & \text{Obj} \\ \text{ROLE} & \text{Goods} \end{bmatrix} \right\rangle \end{bmatrix}$$

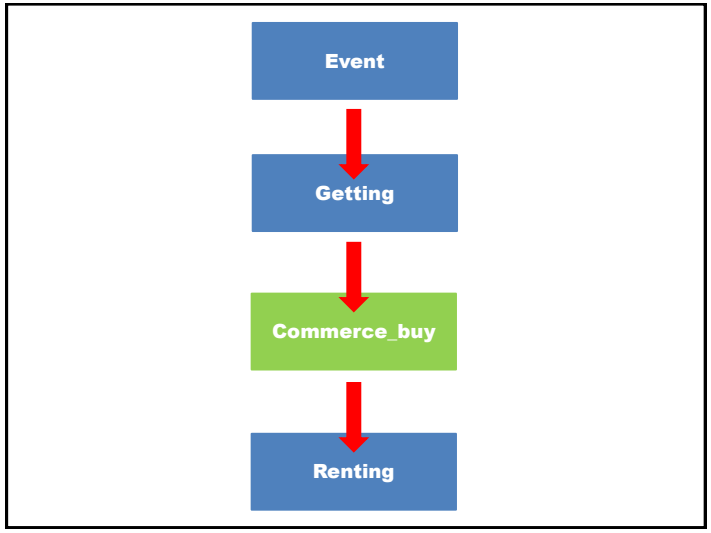
Commerce_buy

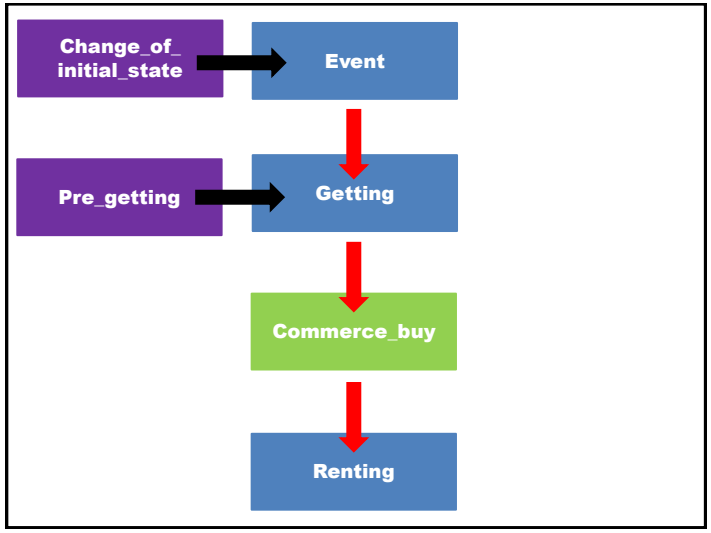
"I'll **purchase** every yard you've got."

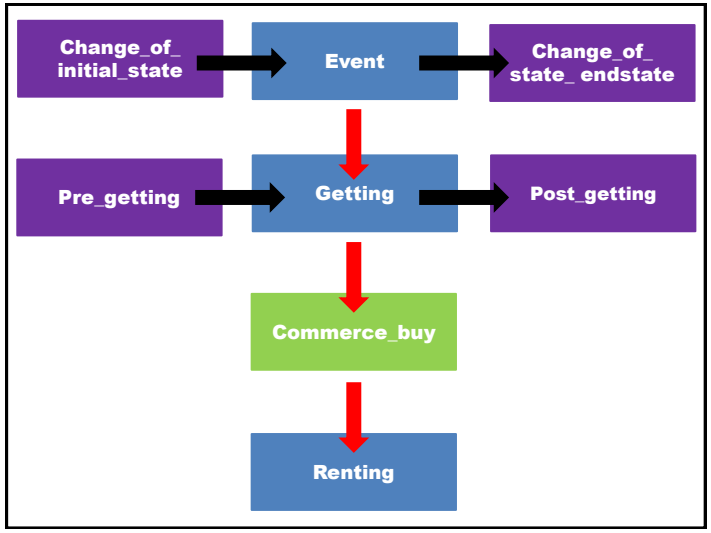
FrameNet Hierarchies

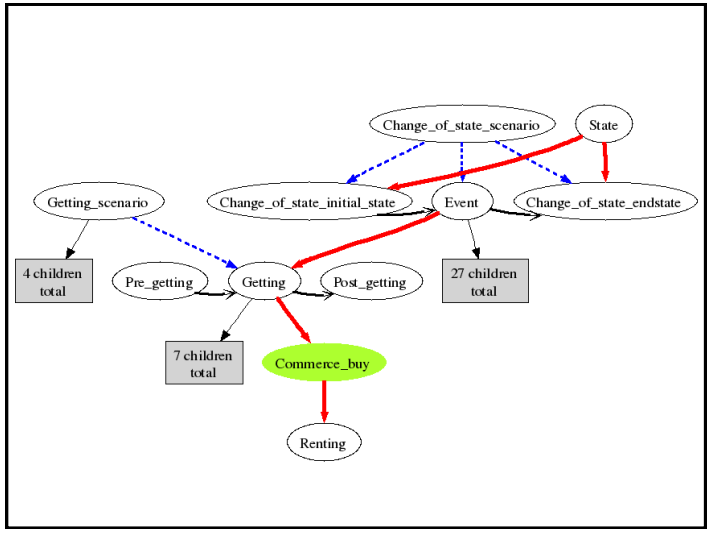




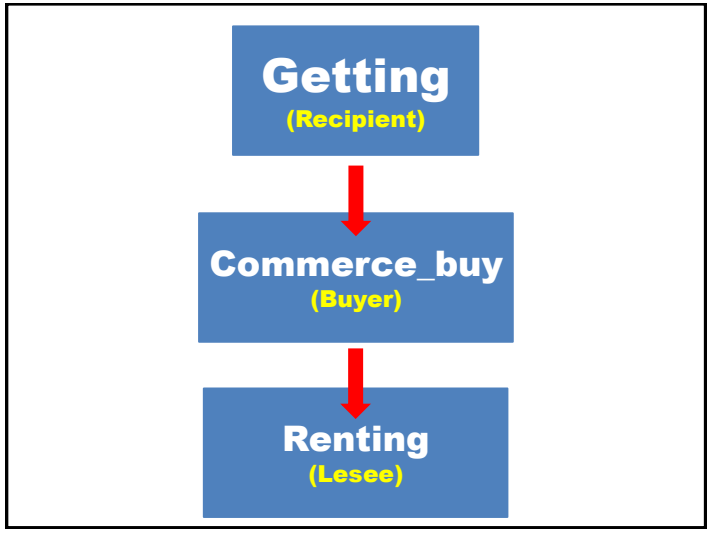

Event
Getting
Commerce_buy
Renting

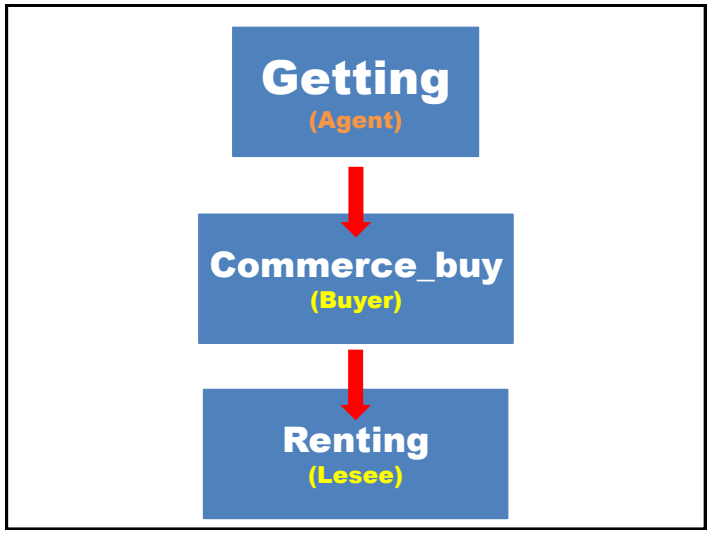

Change_of_ initial_state
Event
Pre_getting
Getting
Commerce_buy
Renting

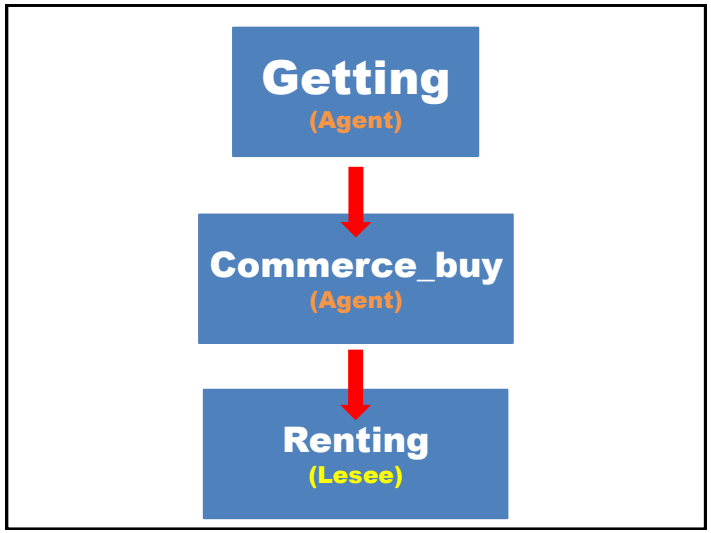

Change_of_ initial_state
Event
Change_of_ state_ endstate
Pre_getting
Getting
Post_getting
Commerce_buy
Renting

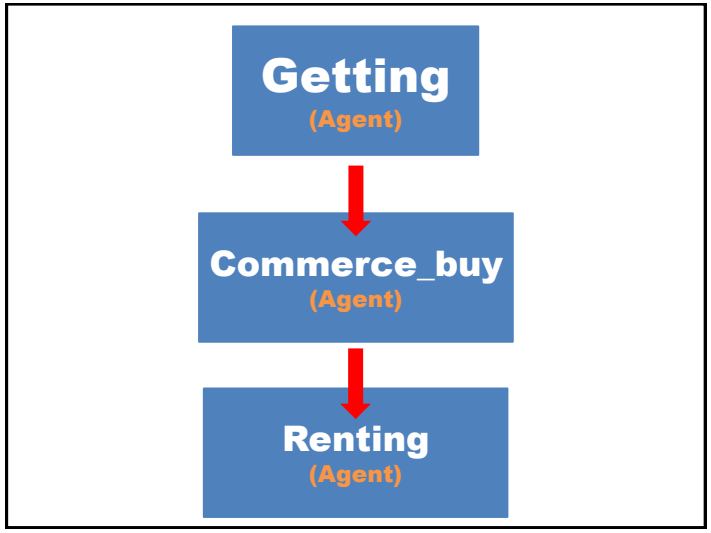

Change_of_state_scenario
State
Getting_scenario
Change_of_state_initial_state
Event
Change_of_state_endstate
4 children total
Pre_getting
Getting
Post_getting
27 children total
7 children total
Commerce_buy
Renting

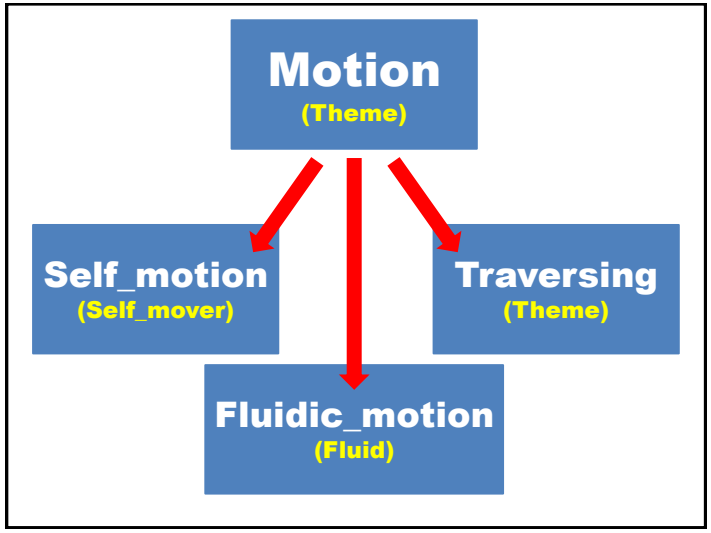
Using Inheritance Hierarchies to Reduce the Semantic Role Set

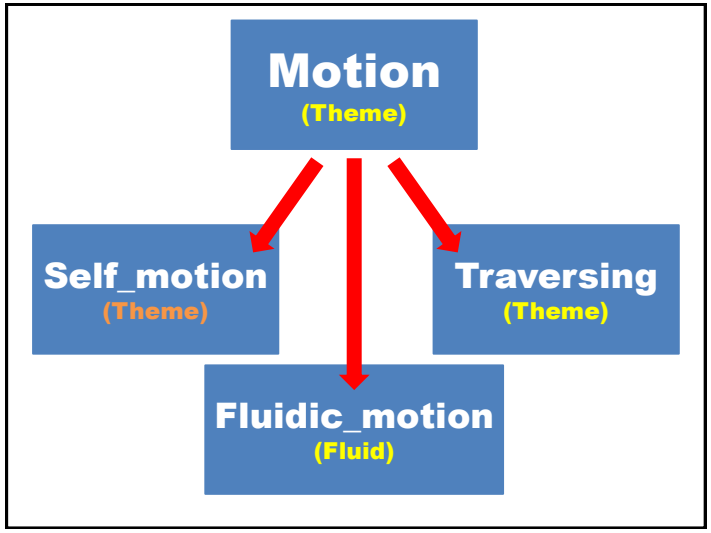


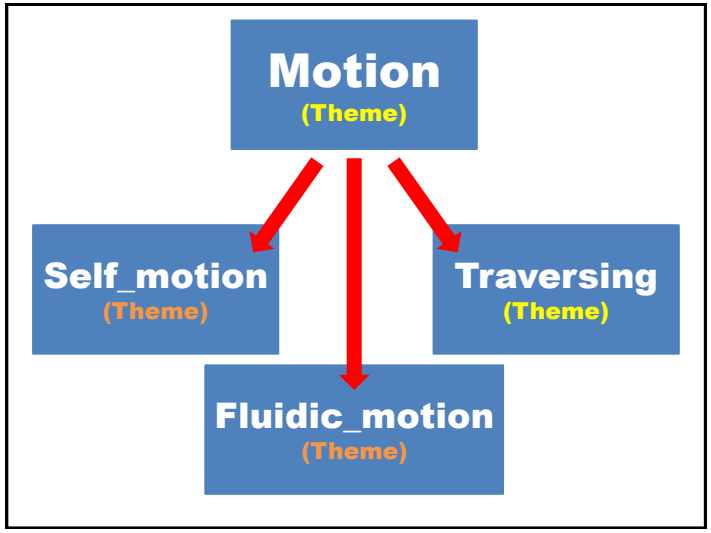





Getting
(Agent)
Commerce_buy
(Agent)
Renting
(Agent)


Motion
(Theme)
Self_motion
(Self_mover)
Traversing
(Theme)
Fluidic_motion
(Fluid)


Motion
(Theme)
Self_motion
(Theme)
Traversing
(Theme)
Fluidic_motion
(Fluid)


Motion
(Theme)
Self_motion
(Theme)
Traversing
(Theme)
Fluidic_motion
(Theme)

Results for Inheritance Hierarchies

Reductions Through Inheritance

	Full Lexicon		Restricted Lexicon	
Cycle	Roles	Frames	Roles	Frames
0	441	1256	289	807
1	364	1129	196	653
2	348	1083	177	596
3	347	1083	176	596
4	347	1083	176	596
5	347	1083		

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	Full Lexicon		Restricted Lexicon	
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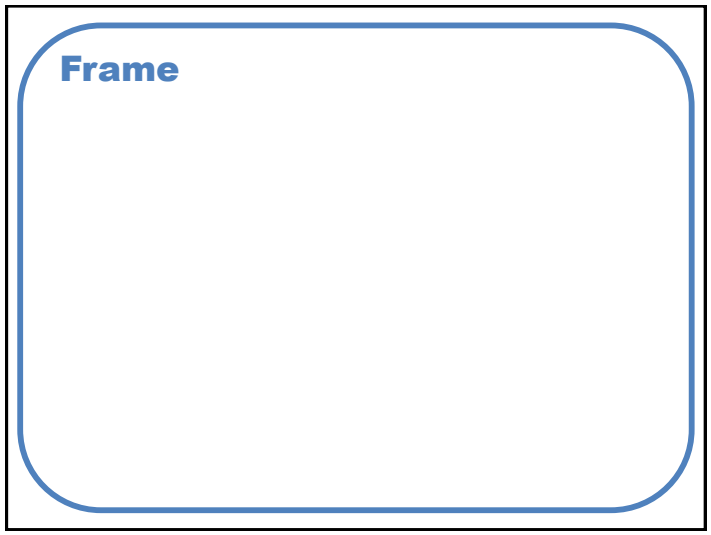
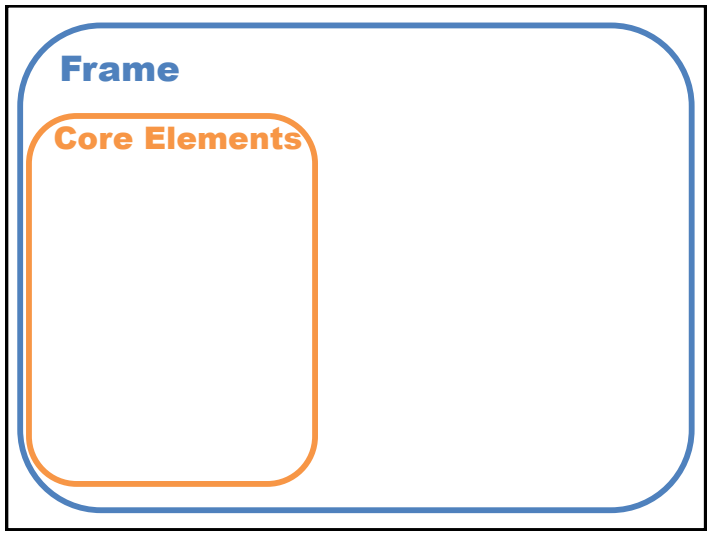
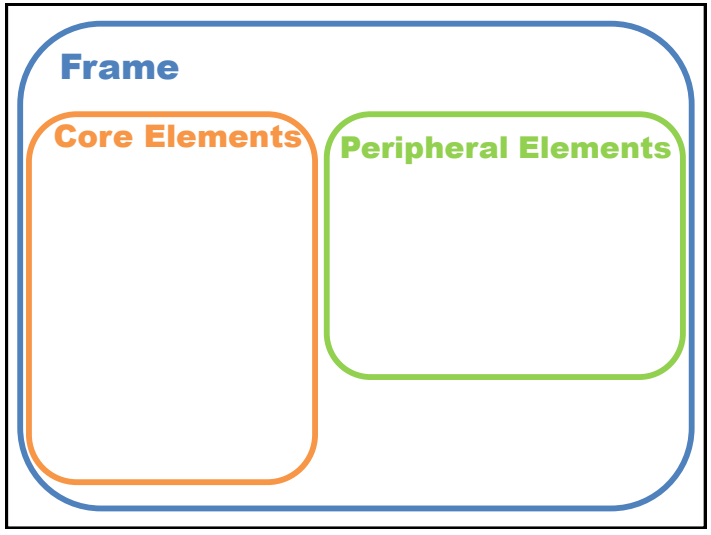
3	347	1083	176	596
4	347	1083	176	596
5	347	1083		

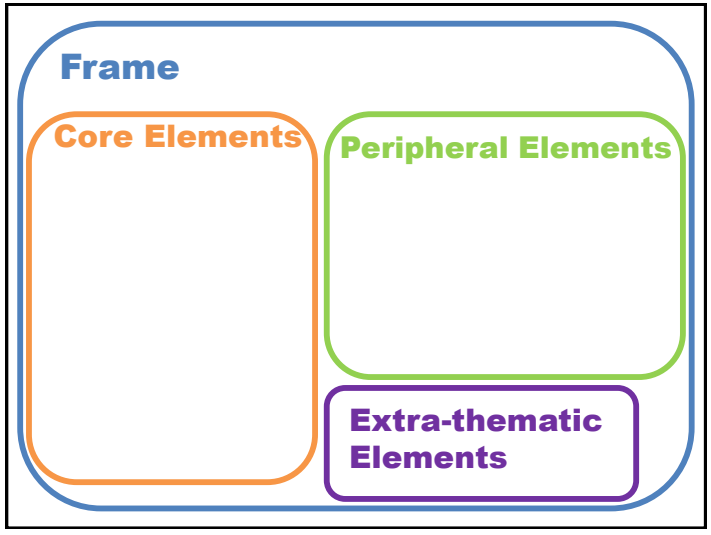
- First run: 21% reduction (347 roles)
- Second run: 39% reduction (176 roles)

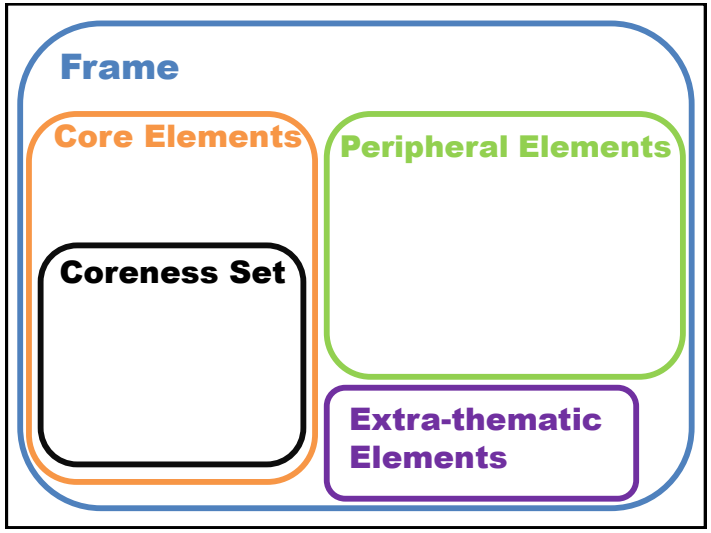
Using Coreness Sets to Reduce the Semantic Role Set


Frame


Frame
Core Elements


Frame
Core Elements
Peripheral Elements


Frame
Core Elements
Peripheral Elements
Extra-thematic Elements



Motion

Coreness Set: {Direction, Distance, Goal, Path, Source}

Motion

Coreness Set: {Direction, Distance, Goal, Path, Source}

"if we assume that…the roles are actually just alternative realizations of the same underlying semantic role, then we can condense all these frames into just one" (5).

Motion

Coreness Set: {Direction, Distance, Goal, Path, Source}

- The car moved [$_{\text{DIRECTION}}$ away].

Motion

Coreness Set: {Direction, Distance, Goal, Path, Source}

- The car moved [$_{\text{DIRECTION}}$ away].
- The car moved [$_{\text{DISTANCE}}$ for 100 yards].

Motion

Coreness Set: {Direction, Distance, Goal, Path, Source}

- The car moved [$_{\text{DIRECTION}}$ away].
- The car moved [$_{\text{DISTANCE}}$ for 100 yards].
- The car moved [$_{\text{GOAL}}$ into the slow lane].

Motion

Coreness Set: {Direction, Distance, Goal, Path, Source}

- The car moved [$_{\text{DIRECTION}}$ away].
- The car moved [$_{\text{DISTANCE}}$ for 100 yards].
- The car moved [$_{\text{GOAL}}$ into the slow lane].
- The car moved [$_{\text{PATH}}$ through the carpool lane].

Motion

Coreness Set: {Direction, Distance, Goal, Path, Source}

- The car moved [$_{\text{DIRECTION}}$ away].
- The car moved [$_{\text{DISTANCE}}$ for 100 yards].
- The car moved [$_{\text{GOAL}}$ into the slow lane].
- The car moved [$_{\text{PATH}}$ through the carpool lane].
- The car moved [$_{\text{SOURCE}}$ away from the berm].

Motion

Coreness Set: {Direction, Distance, Goal, Path, Source}

- The car moved [$_{\text{DIRECTION}}$ away].
- The car moved [$_{\text{DISTANCE}}$ for 100 yards].
- The car moved [$_{\text{GOAL}}$ into the slow lane].
- The car moved [$_{\text{PATH}}$ through the carpool lane].
- The car moved [$_{\text{SOURCE}}$ away from the berm].
- The car moved [away from the berm through the carpool lane into the slow lane for 100 yards].

Results for Coreness Sets

Reductions Through Coreness Sets			
First Stage		Second Stage	
Frames Before	Frames After	Frames Before	Frames (After)
9, 180	7,804	7, 804	7, 672

- 16% frame reduction
- Average 2.8 sub-frames per verb entry

Reductions Through Coreness Sets			
First Stage		Second Stage	
Frames Before	Frames After	Frames Before	Frames (After)
9, 180	7,804	7, 804	7, 672

- 16% frame reduction
- Average 2.8 sub-frames per verb entry
- **Stage 1**: Substitute labels with coreness sets; eliminate duplicate sub-frames
- **Stage 2**: Check for frames with 2 or more arguments from coreness set; eliminate duplicate arguments