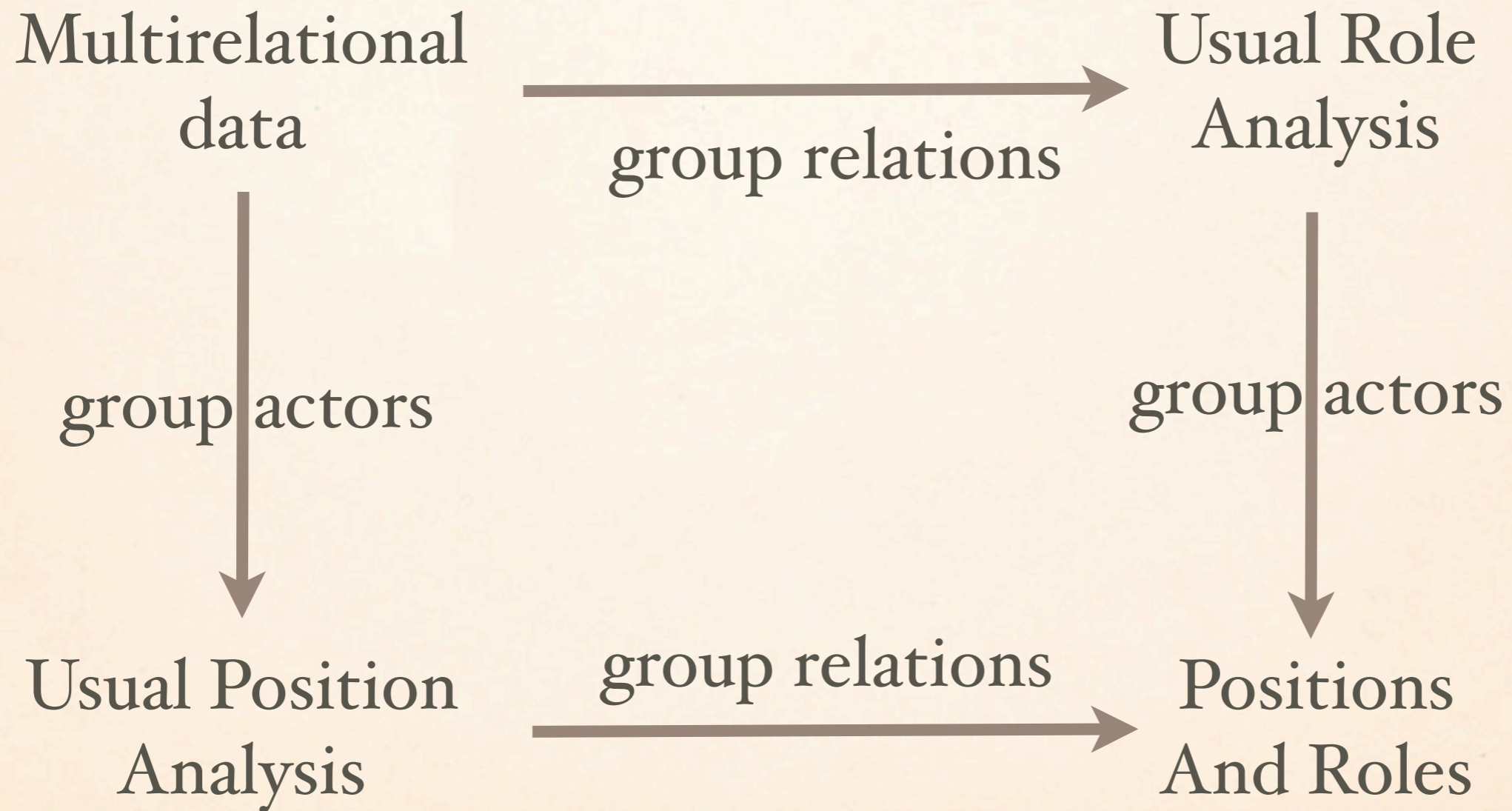


NETWORK POSITIONS AND ROLES

SOCIAL NETWORK ANALYSIS

NITIN AGARWAL

POSITION AND ROLES



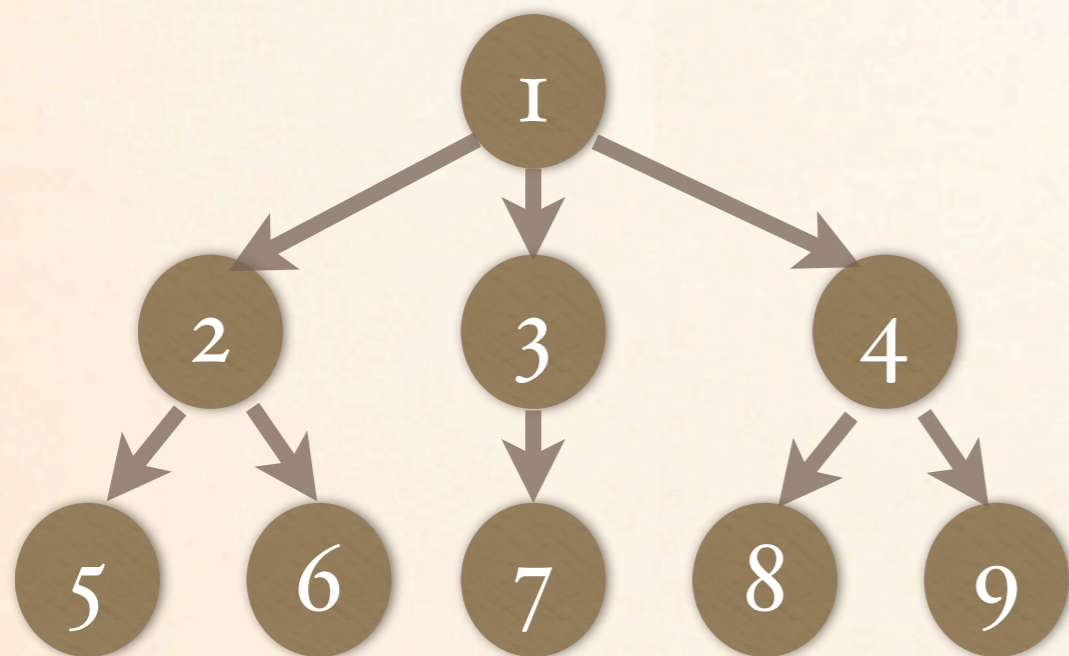
ROLES

- ❖ Levels of Roles
 - ❖ Global role structures: entire group of actors
 - ❖ Local roles: subset of actors
 - ❖ Individual or ego roles: single actor

EQUIVALENCES IN NETWORKS

- ❖ Structural equivalence
- ❖ Automorphic and isomorphic equivalence
- ❖ Regular equivalence
- ❖ Local role equivalence
- ❖ Ego algebras

STRUCTURAL EQUIVALENCE



$B_{(SE)_I} : \{I\}$

$B_{(SE)_2} : \{2\}$

$B_{(SE)_3} : \{3\}$

$B_{(SE)_4} : \{4\}$

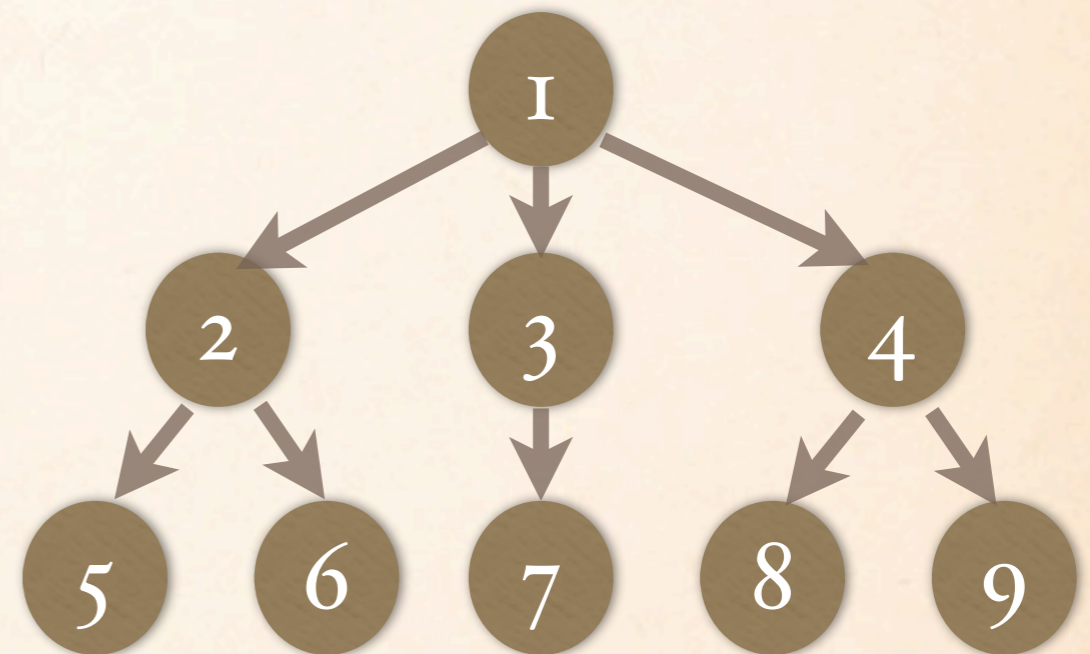
$B_{(SE)_5} : \{5,6\}$

$B_{(SE)_6} : \{7\}$

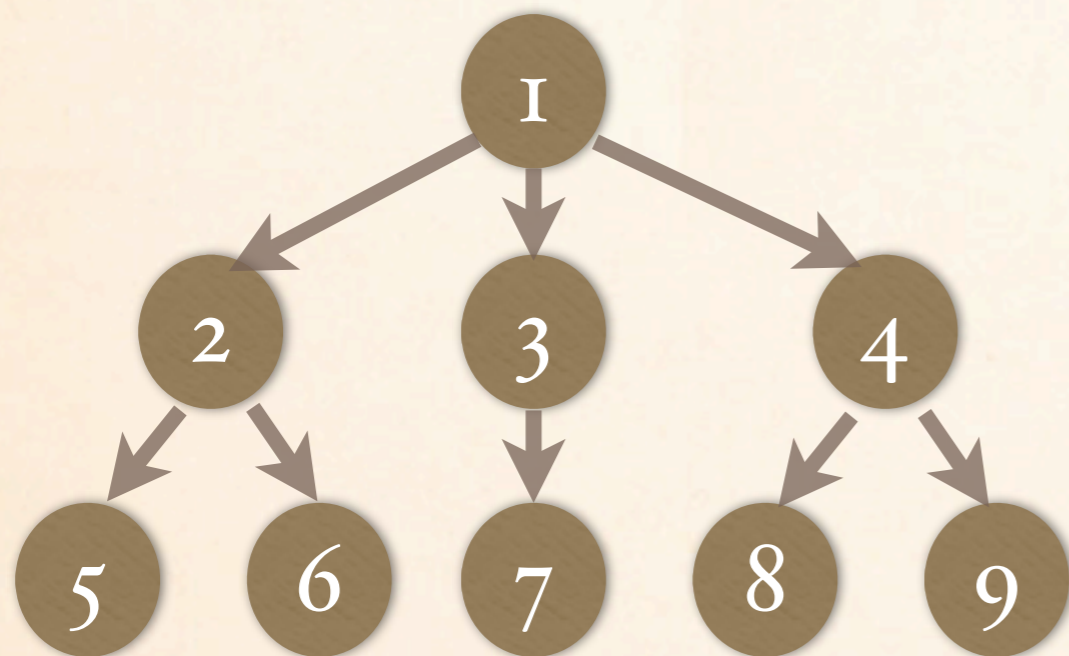
$B_{(SE)_7} : \{8,9\}$

AUTOMORPHIC EQUIVALENCE

$B_{(AE)_1} : \{1\}$
 $B_{(AE)_2} : \{2,4\}$
 $B_{(AE)_3} : \{3\}$
 $B_{(AE)_4} : \{5,6,8,9\}$
 $B_{(AE)_5} : \{7\}$



REGULAR EQUIVALENCE

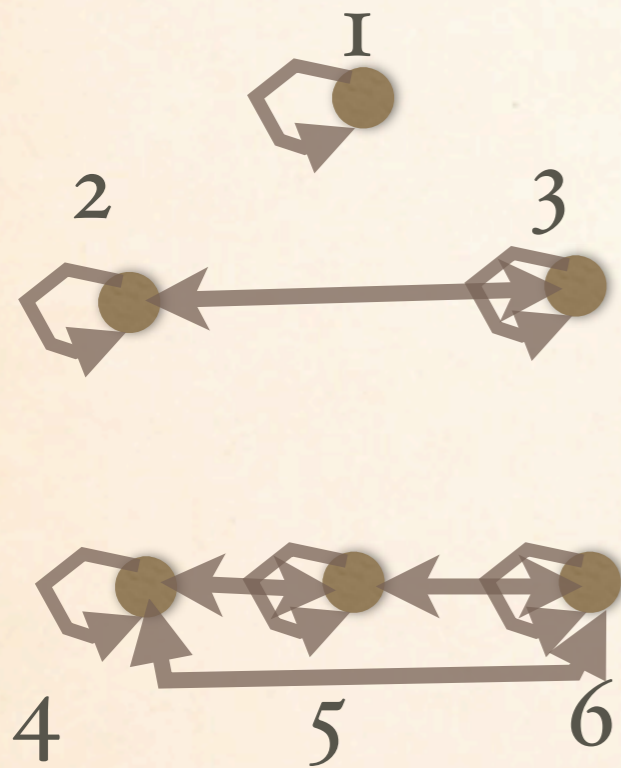


$$B_{(RE)_1} : \{1\}$$

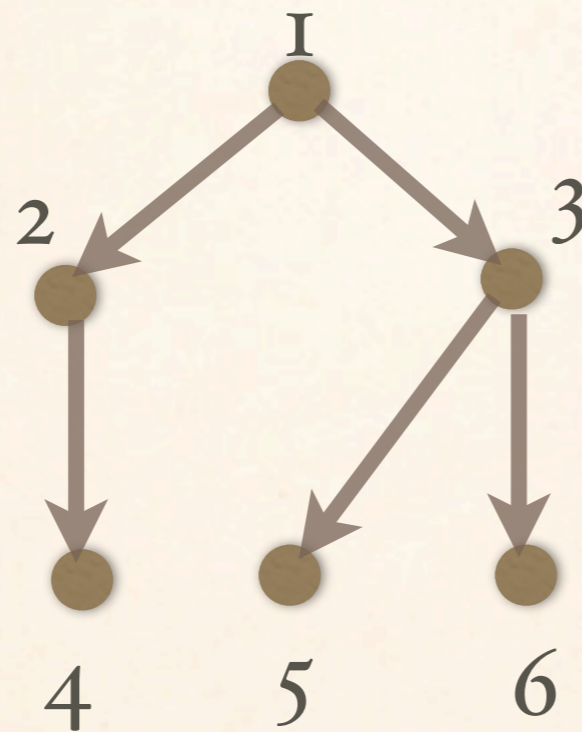
$$B_{(RE)_2} : \{2,3,4\}$$

$$B_{(RE)_3} : \{5,6,7,8,9\}$$

LOCAL ROLE EQUIVALENCE



L



H

Actor 1:

L: 1

H: 2,3

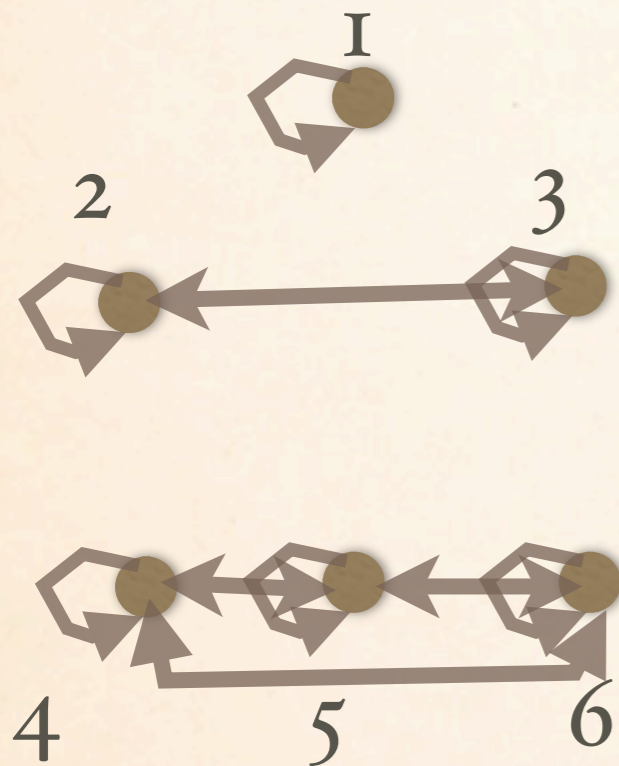
HL: 2,3

HH: 4,5,6

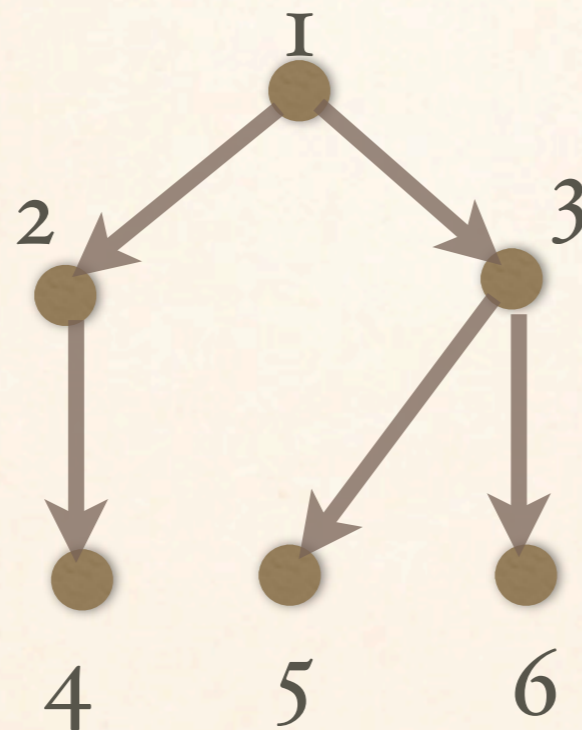
\emptyset : \emptyset

$\{\{L\},\{H,HL\},\{HH\},\{\emptyset\}\}$

LOCAL ROLE EQUIVALENCE



L



H

Actor 1:

$\{\{L\}, \{H, HL\}, \{HH\}, \{\emptyset\}\}$

Actor 2:

L: 2,3

H: 4

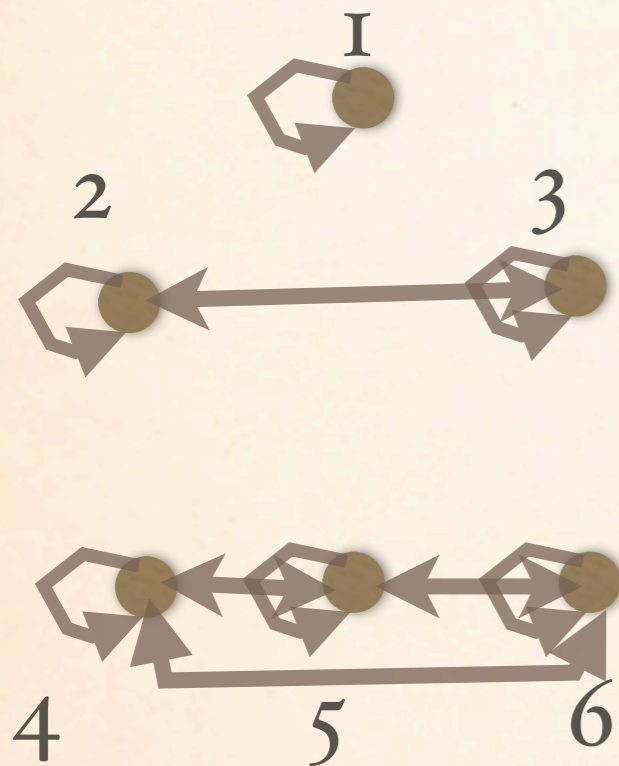
HL: 4,5,6

HH: \emptyset

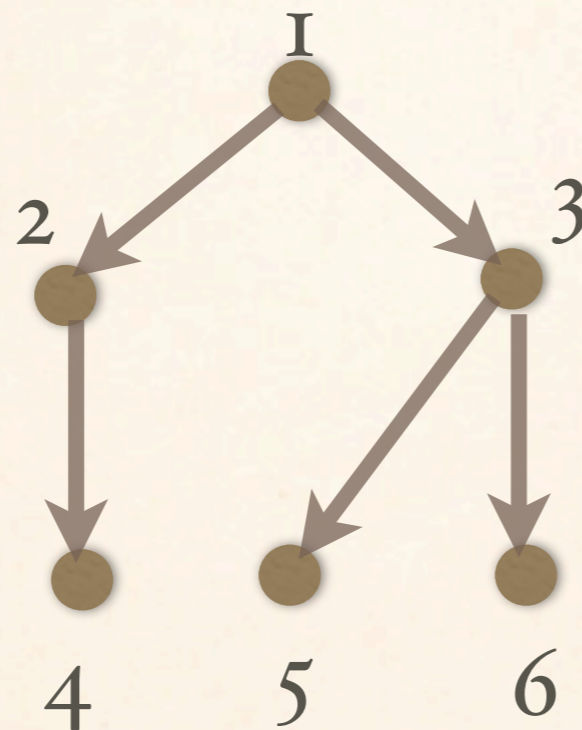
\emptyset : \emptyset

$\{\{L\}, \{H\}, \{HL\}, \{HH, \emptyset\}\}$

LOCAL ROLE EQUIVALENCE



L



H

Actor 1:

$\{\{L\}, \{H, HL\}, \{HH\}, \{\emptyset\}\}$

Actor 2:

$\{\{L\}, \{H\}, \{HL\}, \{HH, \emptyset\}\}$

Actor 3:

L: 2,3

H: 4

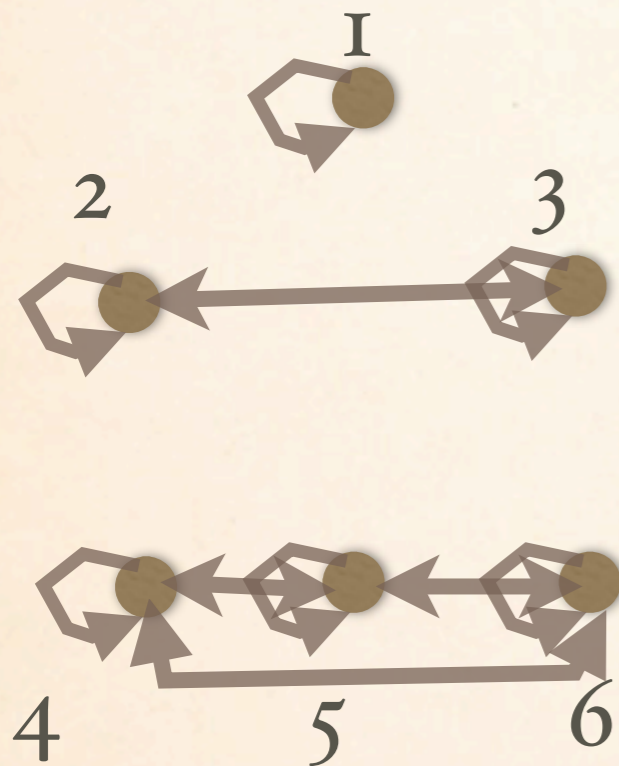
HL: 4,5,6

HH: \emptyset

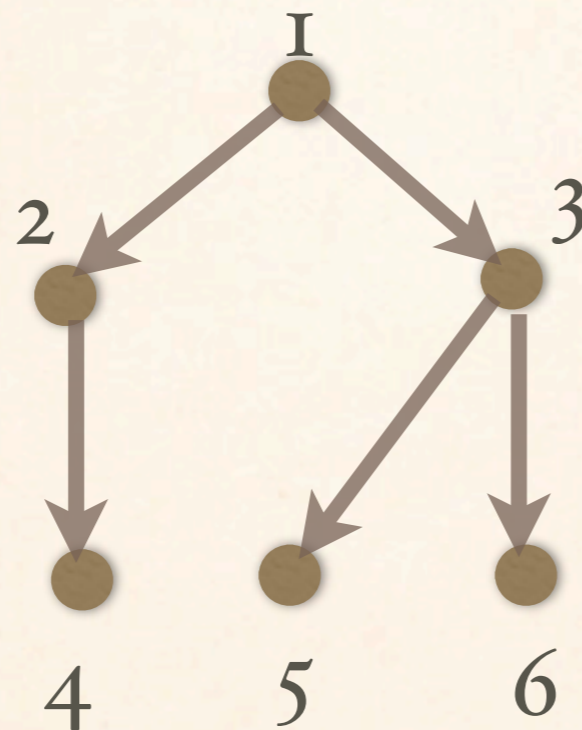
\emptyset : \emptyset

$\{\{L\}, \{H\}, \{HL\}, \{HH, \emptyset\}\}$

LOCAL ROLE EQUIVALENCE



L



H

Actor 1:

$\{\{L\}, \{H, HL\}, \{HH\}, \{\emptyset\}\}$

Actor 2:

$\{\{L\}, \{H\}, \{HL\}, \{HH, \emptyset\}\}$

Actor 3:

$\{\{L\}, \{H\}, \{HL\}, \{HH, \emptyset\}\}$

Actor 4:

$\{\{L\}, \{H, HL, HH, \emptyset\}\}$

Actor 5:

$\{\{L\}, \{H, HL, HH, \emptyset\}\}$

Actor 6:

$\{\{L\}, \{H, HL, HH, \emptyset\}\}$

LOCAL ROLE EQUIVALENCE

Actor 1:

$\{\{L\}, \{H, HL\}, \{HH\}, \{\emptyset\}\}$

Actor 2:

$\{\{L\}, \{H\}, \{HL\}, \{HH, \emptyset\}\}$

Actor 3:

$\{\{L\}, \{H\}, \{HL\}, \{HH, \emptyset\}\}$

Actor 4:

$\{\{L\}, \{H, HL, HH, \emptyset\}\}$

Actor 5:

$\{\{L\}, \{H, HL, HH, \emptyset\}\}$

Actor 6:

$\{\{L\}, \{H, HL, HH, \emptyset\}\}$

Role relations



LOCAL ROLE EQUIVALENCE

Actor 1:

$\{\{L\},\{H,HL\},\{HH\},\{\emptyset\}\}$

Actor 2:

$\{\{L\},\{H\},\{HL\},\{HH,\emptyset\}\}$

Actor 3:

$\{\{L\},\{H\},\{HL\},\{HH,\emptyset\}\}$

Actor 4:

$\{\{L\},\{H,HL,HH,\emptyset\}\}$

Actor 5:

$\{\{L\},\{H,HL,HH,\emptyset\}\}$

Actor 6:

$\{\{L\},\{H,HL,HH,\emptyset\}\}$

Role sets

LOCAL ROLE EQUIVALENCE

Actor 1:

$\{\{L\}, \{H, HL\}, \{HH\}, \{\emptyset\}\}$

Actor 2:

$\{\{L\}, \{H\}, \{HL\}, \{HH, \emptyset\}\}$

Actor 3:

$\{\{L\}, \{H\}, \{HL\}, \{HH, \emptyset\}\}$

Actor 4:

$\{\{L\}, \{H, HL, HH, \emptyset\}\}$

Actor 5:

$\{\{L\}, \{H, HL, HH, \emptyset\}\}$

Actor 6:

$\{\{L\}, \{H, HL, HH, \emptyset\}\}$

$B_{(LRE)_1} : \{1\}$

$B_{(LRE)_2} : \{2, 3\}$

$B_{(LRE)_3} : \{4, 5, 6\}$

THANK YOU