

Appendix B

Trace of the System

In this appendix, we give a full trace of the example that was presented in section 7.1, where the system acted as the direction giver.

To make the trace readable, we have formatted it in several ways. Lines have been formatted so that they will fit on the page. Lines that have been broken are marked by the continuation `-` at the start of the line. When a plan derivation or list of actions is a parameter in a proposition, they are represented by a variable `Vn` where `n` is an integer. The values of any variables in a proposition follow the proposition. We have also added section titles which correspond to those in section 7.1.

Prolog represents certain propositions differently than they are in mathematical formalism. Lambda expressions of the form $\lambda X \cdot \text{Prop}$ are represented as:

```
X^Prop
```

Lambda extraction, $(\lambda X \cdot \text{Prop})(Y)$, is represented as:

```
apply(X^Prop,Y)
```

Furthermore unbound Prolog variables are represented as `_n`, where `n` is an integer.

B.1 Initialization

New Value of giver is system
New Value of recipient is user
User Model: Adding Proposition
category(highway1,highway)

User Model: Adding Proposition
called(highway1,128)

User Model: Adding Proposition
category(street1,street)

User Model: Adding Proposition
called(street1,2A)

User Model: Adding Proposition
category(avenue1,avenue)

User Model: Adding Proposition
called(avenue1,Mass)

User Model: Adding Proposition
category(street2,street)

User Model: Adding Proposition
called(street2,Lowell)

User Model: Adding Proposition
category(avenue2,avenue)

User Model: Adding Proposition
called(avenue2,Bartlett)

User Model: Adding Proposition
category(town1,town)

User Model: Adding Proposition
called(town1,Newton)

User Model: Adding Proposition
category(exit1,exit)

User Model: Adding Proposition
called(exit1,2A)

User Model: Adding Proposition
category(inter1,intersection)

User Model: Adding Proposition
called(inter1,Mass Avenue)

User Model: Adding Proposition
category(inter2,intersection)

User Model: Adding Proposition
called(inter2,Lowell Street)

User Model: Adding Proposition
has(inter2,sign1)

User Model: Adding Proposition
has(inter2,lights1)

User Model: Adding Proposition
category(inter3,intersection)

User Model: Adding Proposition
called(inter3,Bartlett Avenue)

User Model: Adding Proposition
category(building1,building)

User Model: Adding Proposition
called(building1,Academy)

User Model: Adding Proposition
category(sign1,sign)

User Model: Adding Proposition
category(lights1,traffic_lights)

User Model: Adding Proposition
world([sign1,town1,street1,inter1,inter2,street2,building1])

User Model: Adding Proposition
salient_category(5,town)

User Model: Adding Proposition
salient_category(4,highway)

User Model: Adding Proposition
salient_category(3,avenue)

User Model: Adding Proposition
salient_category(3,street)

User Model: Adding Proposition
salient_category(3,exit)

User Model: Adding Proposition
salient_category(2,traffic_lights)

User Model: Adding Proposition
salient_category(1,intersection)

User Model: Adding Proposition
salient_category(1,sign)

User Model: Adding Proposition
salient_category(1,building)

User Model: Adding Proposition

salient_category(0,_13727)

User Model: Adding Proposition

salient_property(1,town,_13885^called(_13885,_13921))

User Model: Adding Proposition

salient_property(2,highway,_14231^called(_14231,_14267))

User Model: Adding Proposition

salient_property(2,avenue,_14577^called(_14577,_14613))

User Model: Adding Proposition

salient_property(2,street,_14923^called(_14923,_14959))

User Model: Adding Proposition

salient_property(2,exit,_15269^called(_15269,_15305))

User Model: Adding Proposition

salient_property(3,intersection,traffic_lights,_15623^_15640^has(_15623,_15640))

User Model: Adding Proposition

salient_property(2,intersection,sign,_180950^_180967^has(_180950,_180967))

User Model: Adding Proposition

salient_property(2,intersection,_181384^called(_181384,_181420))

User Model: Adding Proposition

salient_property(0,_181722,_181733)

User Model: Adding Proposition

salient_property(0,_181907,_181918,_181929)

User Model: Adding Proposition

confidence_threshold(intersection,2)

User Model: Adding Proposition

place(town1,[highway1],[,(270,,(highway1,+1))])

User Model: Adding Proposition

place(exit1,[highway1,street1],[,(0,,(street1,+1))],[,(90,,(highway1,-1))],[,(270,,(highway1,+1))])

User Model: Adding Proposition

place(inter1,[street1,avenue1],[,(0,,(street1,+1))],[,(90,,(avenue1,+1))],[,(180,,(street1,-1))],[,(270,,(avenue1,-1))])

User Model: Adding Proposition

place(inter2,[street1,street2],[,(0,,(street1,+1))],[,(90,,(street2,+1))],[,(180,,(street1,-1))],[,(270,,(street2,-1))])

User Model: Adding Proposition

place(inter3,[street2,avenue2],[,(0,,(avenue2,-1))],[,(90,,(street2,+1))],[,(180,,(avenue2,+1))],[,(270,,(street2,-1))])

User Model: Adding Proposition

place(building1,[avenue2],[,(0,,(street2,-1))])

User Model: Adding Proposition

path(highway1,[town1,exit1])

User Model: Adding Proposition
path(street1,[exit1,inter1,inter2])

User Model: Adding Proposition
path(avenue1,[inter1])

User Model: Adding Proposition
path(street2,[inter2,inter3])

User Model: Adding Proposition
path(avenue2,[inter3,building1])

B.2 Constructing “Go to the Lowell Street Intersection.”

```
New Value of route_origin is here(exit1,street1,+1)
New Value of route is route([goto(exit1,inter2,street1,+1,1)])
New Value of route_dest is here(inter2,street1,+1)
=====
Checking Goal Rules
=====

Applying i_rule2
goal(system, knowroute(user, system, route([goto(exit1, inter2, street1, +1, 1)])))

=====
Responding
=====

Goal : knowroute(user, system, route([goto(exit1, inter2, street1, +1, 1)]))
Effect: bel(user, goal(system, knowroute(user, system, route([goto(exit1, inter2, street1, +1, 1)]))))

-----
Construct
-----

Initial Setup
-----
Trying: describe-route(route([goto(exit1, inter2, street1, +(1), 1)]))
New edge added

End of Initialization
-----

Expanding (step 0 active 1)
-----
Head: describe-route(route([goto(exit1, inter2, street1, +(1), 1)]))
Need: directions(here(exit1, street1, +(1)), [goto(exit1, inter2, street1, +(1), 1)], here(inter2, street1, +(
- 1)))
Trying: directions(here(exit1, street1, +(1)), [goto(exit1, inter2, street1, +(1), 1)], here(inter2, street1, +(
- 1)))
<con>[goto(exit1, inter2, street1, +(1), 1)]=[_190930|_190935]
New edge added
Trying: directions(here(exit1, street1, +(1)), [goto(exit1, inter2, street1, +(1), 1)], here(inter2, street1, +(
- 1)))
<con>here(exit1, street1, +(1))=here(inter2, street1, +(1))
*** failed ***
```

Expanding (step 1 active 1)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))
Need: direction(here(exit1,street1,+(1)),goto(exit1,inter2,street1,+(1),1),_190407)
Trying: direction(here(exit1,street1,+(1)),goto(exit1,inter2,street1,+(1),1),_190407)
<con>here(exit1,street1,+(1))=here(_191543,_191544,_191545)
<con>goto(exit1,inter2,street1,+(1),1)=goto(exit1,_191553,street1,+(1),_191556)
New edge added
Trying: direction(here(exit1,street1,+(1)),goto(exit1,inter2,street1,+(1),1),_190407)
<con>here(exit1,street1,+(1))=here(_191543,_191544,_191545)
<con>goto(exit1,inter2,street1,+(1),1)=turn(exit1,street1,+(1),_191555,_191556,_191557)
*** failed ***

Expanding (step 2 active 1)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))
Need: ref(_191544,inter2)
<ma> ref(_191544,inter2)
New edge added

Expanding (step 3 active 1)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))
Need: s-goto(entity(1,inter2))
Trying: s-goto(entity(1,inter2))
<con>place(inter2,_194042,_194043)
New edge added

Expanding (step 4 active 1)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))
Need: set_context(exit1,inter2,street1,+(1))
<ma> set_context(exit1,inter2,street1,+(1))
New edge added

Expanding (step 5 active 1)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))
Need: refer(entity(1,inter2),_195577)
Trying: refer(entity(1,inter2),_195577)
New edge added

Expanding (step 6 active 1)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))
Need: s-refer(entity(1,inter2))
Trying: s-refer(entity(1,inter2))
New edge added

Expanding (step 7 active 1)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))
Need: describe(entity(1,inter2),_199803)
Trying: describe(entity(1,inter2),_199803)
New edge added

Expanding (step 8 active 1)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: context_current(_201510)

<ma> context_current(_201510)

New edge added

Expanding (step 9 active 1)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],entity(- 1,inter2),_203296,_203297,_203298)

Trying: headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],entity(- 1,inter2),_203296,_203297,_203298)

New edge added

Expanding (step 10 active 1)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: s-attrib(entity(1,inter2),_205400^category(_205400,_205404))

Trying: s-attrib(entity(1,inter2),_205400^category(_205400,_205404))

<con>category(inter2,_205404)

New edge added

Expanding (step 11 active 1)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],_207688^ab(system,- user,category(_207688,intersection)),_207668)

<ma> subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],_207688^ab(system,- user,category(_207688,intersection)),_207668)

New edge added

Expanding (step 12 active 1)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: ref(entity(1,inter2),_210291)

<ma> ref(entity(1,inter2),_210291)

New edge added

Expanding (step 13 active 1)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: _213751=[category(inter2,intersection)]

<ma> _213751=[category(inter2,intersection)]

New edge added

Expanding (step 14 active 1)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: confidence_headnoun(_216154,entity(1,inter2),intersection)

<ma> confidence_headnoun(_216154,entity(1,inter2),intersection)

New edge added

Expanding (step 15 active 1)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: modifiers(entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],1,_218597)

Trying: modifiers(entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],1,_218597)

New edge added

Trying: modifiers(entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],1,1)

<con>[inter1,inter2]=[inter2]

*** failed ***

Expanding (step 16 active 1)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: modifier(entity(1,inter2),[inter1,inter2],_221140,[category(inter2,intersection)],_221142,
- _221143)

Trying: modifier(entity(1,inter2),[inter1,inter2],_221140,[category(inter2,intersection)],
- _221142,_221143)

New edge added

Trying: modifier(entity(1,inter2),[inter1,inter2],_221140,[category(inter2,intersection)],
- _221142,_221143)

New edge added

Expanding (step 17 active 2)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: salient_attrib(entity(1,inter2),_224853,[category(inter2,intersection)],_224855)

<ma> salient_attrib(entity(1,inter2),_224853,[category(inter2,intersection)],_224855)

New edge added

Expanding (step 18 active 2)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: salient_attrib_rel(entity(1,inter2),_223855,_223856,[category(inter2,intersection)],
- _223858)

<ma> salient_attrib_rel(entity(1,inter2),_223855,_223856,[category(inter2,intersection)],
- _223858)

New edge added

Expanding (step 19 active 2)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: s-attrib(entity(1,inter2),_227749^called(_227749,Lowell Street))

Trying: s-attrib(entity(1,inter2),_227749^called(_227749,Lowell Street))

<con>called(inter2,Lowell Street)

New edge added

Expanding (step 20 active 2)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: s-attrib-rel(entity(1,inter2),entity(2,lights1),_231783^_231786^has(_231783,_231786))

Trying: s-attrib-rel(entity(1,inter2),entity(2,lights1),_231783^_231786^has(_231783,_231786))

<con>has(inter2,lights1)

New edge added

Expanding (step 21 active 2)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: subset([inter1,inter2],_234795^ab(system,user,apply(_234805^called(_234805,Lowell Street),
- _234795)),_234789)

<ma> subset([inter1,inter2],_234795^ab(system,user,apply(_234805^called(_234805,Lowell Street),
- _234795)),_234789)

New edge added

Expanding (step 22 active 2)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: ref(entity(2,lights1),_237962)

<ma> ref(entity(2,lights1),_237962)

New edge added

Expanding (step 23 active 2)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1])))

Need: confidence_attrib(_241269,entity(1,inter2),_241276^called(_241276,Lowell Street))

<ma> confidence_attrib(_241269,entity(1,inter2),_241276^called(_241276,Lowell Street))

New edge added

Expanding (step 24 active 2)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1])))

Need: subset([inter1,inter2],_244471^ab(system,user,apply(apply(_244484^_244487^has(_244484,-_244487),_244471),lights1)),_244465)

<ma> subset([inter1,inter2],_244471^ab(system,user,apply(apply(_244484^_244487^has(_244484,-_244487),_244471),lights1)),_244465)

New edge added

Expanding (step 25 active 2)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1])))

Need: confidence_add(_248713,1,2)

<ma> confidence_add(_248713,1,2)

New edge added

Expanding (step 26 active 2)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1])))

Need: refer(entity(2,lights1),_252086)

Trying: refer(entity(2,lights1),_252086)

New edge added

Expanding (step 27 active 2)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1])))

Need: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]- ,3,_255211)

Trying: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection-)],3,_255211)

New edge added

Trying: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection-)],3,3)

<con>[inter2]=[inter2]

<con>confidence_exceed(entity(1,inter2),3)

New edge added

Expanding (step 28 active 3)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1])))

Need: s-refer(entity(2,lights1))

Trying: s-refer(entity(2,lights1))

New edge added

Expanding (step 29 active 3)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1])))

Need: null

New edge added

Expanding (step 30 active 3)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: modifier(entity(1,inter2),[inter2],_263909,[called(inter2,Lowell Street),category(inter2,
- intersection)],_263911,_263912)

Trying: modifier(entity(1,inter2),[inter2],_263909,[called(inter2,Lowell Street),category(inter2,
- intersection)],_263911,_263912)

New edge added

Trying: modifier(entity(1,inter2),[inter2],_263909,[called(inter2,Lowell Street),category(inter2,
- intersection)],_263911,_263912)

New edge added

Expanding (step 31 active 4)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: _270450=here(inter2,street1,+(1))

<ma> _270450=here(inter2,street1,+(1))

New edge added

Expanding (step 32 active 4)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: salient_attrib(entity(1,inter2),_275080,[called(inter2,Lowell Street),category(inter2,
- intersection)],_275082)

<ma> salient_attrib(entity(1,inter2),_275080,[called(inter2,Lowell Street),category(inter2,
- intersection)],_275082)

*** failed ***

No edges added

Expanding (step 33 active 3)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: salient_attrib_rel(entity(1,inter2),_273826,_273827,[called(inter2,Lowell Street),category(
- inter2,intersection)],_273829)

<ma> salient_attrib_rel(entity(1,inter2),_273826,_273827,[called(inter2,Lowell Street),category(inter2
- ,intersection)],_273829)

New edge added

Expanding (step 34 active 3)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: directions(here(inter2,street1,+(1)),[],here(inter2,street1,+(1)))

Trying: directions(here(inter2,street1,+(1)),[],here(inter2,street1,+(1)))

<con> []=[_287166|_287171]

*** failed ***

Trying: directions(here(inter2,street1,+(1)),[],here(inter2,street1,+(1)))

<con> here(inter2,street1,+(1))=here(inter2,street1,+(1))

<con> []=[]

New edge added

Expanding (step 35 active 3)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: s-attrib-rel(entity(1,inter2),entity(3,lights1),_283375^_283378^has(_283375,_283378))

Trying: s-attrib-rel(entity(1,inter2),entity(3,lights1),_283375^_283378^has(_283375,_283378))

<con> has(inter2,lights1)

New edge added

Expanding (step 36 active 3)

Head: describe-route(route([goto(exit1,inter2,street1,+(1),1)]))

Need: null

New edge added

Constructed Plan

describe-route(route([goto(exit1,inter2,street1,+(1),1)]))
+-directions(here(exit1,street1,+(1)),[goto(exit1,inter2,street1,+(1),1)],here(inter2,street1,+(
- 1)))
+-direction(here(exit1,street1,+(1)),goto(exit1,inter2,street1,+(1),1),here(inter2,street1,+(
| - 1)))
| +-ref(entity(1,inter2),inter2)
| +-s-goto(entity(1,inter2))
| +-set_context(exit1,inter2,street1,+(1))
| +-refer(entity(1,inter2),3)
| | +-s-refer(entity(1,inter2))
| | +-describe(entity(1,inter2),3)
| | +-context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2])
| | +-headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],entity(
| | | - 1,inter2),[inter1,inter2],[category(inter2,intersection)],1)
| | | +-s-attrib(entity(1,inter2),_294018^category(_294018,intersection))
| | | +-subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| | | | - _294018^ab(system,user,category(_294018,intersection)),[inter1,inter2])
| | | +-ref(entity(1,inter2),inter2)
| | | +-[category(inter2,intersection)]=[category(inter2,intersection)]
| | | +-confidence_headnoun(1,entity(1,inter2),intersection)
| | +-modifiers(entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],1,3)
| | +-modifier(entity(1,inter2),[inter1,inter2],[inter2],[category(inter2,intersection)], [
| | | - called(inter2,Lowell Street),category(inter2,intersection)],2)
| | | +-salient_attrib(entity(1,inter2),_294004^called(_294004,Lowell Street),[category(inter2,
| | | | - intersection)],[called(inter2,Lowell Street),category(inter2,intersection)])
| | | +-s-attrib(entity(1,inter2),_294004^called(_294004,Lowell Street))
| | | +-subset([inter1,inter2],_295845^ab(system,user,apply(_294004^called(_294004,
| | | | - Lowell Street),_295845)),[inter2])
| | | +-confidence_attrib(2,entity(1,inter2),_294004^called(_294004,Lowell Street))
| | +-confidence_add(3,1,2)
| | +-modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,
| | | - intersection)],3,3)
| | +-null
| +-here(inter2,street1,+(1))=here(inter2,street1,+(1))
+-directions(here(inter2,street1,+(1)),[],here(inter2,street1,+(1)))
+-null

Actions to be fed to generator

s-attrib(entity(1,inter2),_294004^called(_294004,Lowell Street))
s-attrib(entity(1,inter2),_294018^category(_294018,intersection))
s-refer(entity(1,inter2))
s-goto(entity(1,inter2))

User Model: Adding Proposition

plan(system,p1,knowroute(user,system,route([goto(exit1,inter2,street1,+(1),1)]))

Pushing to focus stack: focus(p1,p1,knowroute(user,system,route([goto(exit1,inter2,street1,+(
- 1),1)]))

```

User Model: Adding Proposition
achieve(p1,p1,knowroute(user,system,route([goto(exit1,inter2,street1,+(1),1)])))

Pushing to focus stack: focus(p1,p13,mb(system,user,place(inter2,_294352,_294353)))
User Model: Adding Proposition
achieve(p1,p13,mb(system,user,place(inter2,_294352,_294353)))

Pushing to focus stack: focus(p1,p20,identify(user,system,entity(1,inter2)))
User Model: Adding Proposition
achieve(p1,p20,identify(user,system,entity(1,inter2)))

Pushing to focus stack: focus(p1,p29,mb(system,user,category(inter2,intersection)))
User Model: Adding Proposition
achieve(p1,p29,mb(system,user,category(inter2,intersection)))

Pushing to focus stack: focus(p1,p44,mb(system,user,called(inter2,Lowell Street)))
User Model: Adding Proposition
achieve(p1,p44,mb(system,user,called(inter2,Lowell Street)))

=====
Checking Acceptance and Collaborative Rules
=====

Applying c_rule2
User Model: Adding Proposition
cstate(system,user,p1,knowroute(user,system,route([goto(exit1,inter2,street1,+(1),1)])))

=====
Checking Goal Rules
=====

Applying g_rule3
goal(system,mb(system,user,achieve(p1,p44,mb(system,user,called(inter2,Lowell Street)))))

Pre-empting the planning for this goal

```

B.3 Understanding “Does it have a sign?”

```

=====
Understanding
=====

-----
Plan Recognizer
-----

Actions = s-accept(p1)

Initial Setup
-----
Adding inactive edge:
Head: s-accept(p1)
Acts: s-accept(p1)

Adding active edge:
Head: accept-plan(_363213)
Need: s-accept(_363213)

```

Adding config (from active edge):

Active: accept-plan(_363213)

Inactive: s-accept(p1)

End of Initial Setup

Applying config (0 left, step 1)

Active: accept-plan(_363213)

Inactive: s-accept(p1)

Adding inactive edge:

Head: accept-plan(p1)

Acts: s-accept(p1)

*** Agenda Empty ***

number of plans found: 2

Number of complete plans found: 1

Consider Plan Derivation

accept-plan(p1)

+s-accept(p1)

Evaluate

<con> achieve(p1,p44,mb(system,user,called(inter2,Lowell Street)))

Assuming achieve(p1,p44,mb(system,user,called(inter2,Lowell Street))) due to effects

Inferred Plan

_364311:accept-plan(p1)

+-_364336:s-accept(p1)

User Model: Adding Proposition

plan(user,p65,mb(system,user,achieve(p1,p44,mb(system,user,called(inter2,Lowell Street))))))

Pushing to focus stack: focus(p65,p65,mb(system,user,achieve(p1,p44,mb(system,user,called(inter2,
- Lowell Street))))))

User Model: Adding Proposition

achieve(p65,p65,mb(system,user,achieve(p1,p44,mb(system,user,called(inter2,Lowell Street))))))

=====
Checking Acceptance and Collaborative Rules

=====
Applying m_accept_rule1

Popping from focus stack: focus(p65,p65,mb(system,user,achieve(p1,p44,mb(system,user,called(inter2,
- Lowell Street))))))

User Model: Adding Proposition

mb(system,user,achieve(p1,p44,mb(system,user,called(inter2,Lowell Street))))

```

Applying m_accept_rule1
Popping from focus stack: focus(p1,p44,mb(system,user,called(inter2,Lowell Street)))
User Model: Adding Proposition
mb(system,user,called(inter2,Lowell Street))

=====
Understanding
=====

-----
Plan Recognizer
-----

Actions = s-accept(p1)

number of plans found: 2
Number of complete plans found: 1

-----
Consider Plan Derivation
-----

accept-plan(p1)
+-s-accept(p1)

-----
Evaluate
-----

<con> achieve(p1,p29,mb(system,user,category(inter2,intersection)))
Assuming achieve(p1,p29,mb(system,user,category(inter2,intersection))) due to effects

Inferred Plan
-----

_370999:accept-plan(p1)
+-_371024:s-accept(p1)

User Model: Adding Proposition
plan(user,p72,mb(system,user,achieve(p1,p29,mb(system,user,category(inter2,intersection)))))

Pushing to focus stack: focus(p72,p72,mb(system,user,achieve(p1,p29,mb(system,user,category(inter2,
- intersection)))))
User Model: Adding Proposition
achieve(p72,p72,mb(system,user,achieve(p1,p29,mb(system,user,category(inter2,intersection)))))

=====
Checking Acceptance and Collaborative Rules
=====

Applying m_accept_rule1
Popping from focus stack: focus(p72,p72,mb(system,user,achieve(p1,p29,mb(system,user,category(inter2,
- intersection)))))
User Model: Adding Proposition
mb(system,user,achieve(p1,p29,mb(system,user,category(inter2,intersection))))

Applying m_accept_rule1

```

```
Popping from focus stack: focus(p1,p29,mb(system,user,category(inter2,intersection)))
User Model: Adding Proposition
mb(system,user,category(inter2,intersection))
```

```
=====
Understanding
=====
```

```
-----
Plan Recognizer
-----
```

```
Actions = s-postpone(p1)
```

```
Initial Setup
```

```
-----
Adding inactive edge:
Head: s-postpone(p1)
Acts: s-postpone(p1)
```

```
Adding active edge:
Head: postpone-plan(_377958)
Need: s-postpone(_377958)
```

```
Adding config (from active edge):
Active:  postpone-plan(_377958)
Inactive: s-postpone(p1)
```

```
End of Initial Setup
```

```
-----
Applying config (0 left, step 1)
```

```
-----
Active:  postpone-plan(_377958)
Inactive: s-postpone(p1)
```

```
Adding inactive edge:
Head: postpone-plan(p1)
Acts: s-postpone(p1)
```

```
*** Agenda Empty ***
```

```
number of plans found: 2
Number of complete plans found: 1
```

```
-----
Consider Plan Derivation
-----
```

```
postpone-plan(p1)
+-s-postpone(p1)
```

```
-----
Evaluate
-----
```

```
<con> not(installment(p1))
<con> error(p1,p20,_379035)
Assuming error(p1,p20,_379035) due to effects
```

```
postponing evaluation of constraint(p1,_379040,_379035)
<con> yield(p1,_379040,[])
<con> constraint(p1,p53,_379035)
<con> content(p1,p53,_379053)
<con> modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,3)=modifiers(_379060,_379061,_379062,_379063,_379064)
```

Inferred Plan

```
_379250:postpone-plan(p1)
+_-379300:s-postpone(p1)
```

```
User Model: Adding Proposition
plan(user,p79,mb(system,user,error(p1,p20,p55)))
```

```
Pushing to focus stack: focus(p79,p79,mb(system,user,error(p1,p20,p55)))
User Model: Adding Proposition
achieve(p79,p79,mb(system,user,error(p1,p20,p55)))
```

```
=====
Checking Acceptance and Collaborative Rules
=====
```

```
Applying m_accept_rule1
Popping from focus stack: focus(p79,p79,mb(system,user,error(p1,p20,p55)))
User Model: Adding Proposition
mb(system,user,error(p1,p20,p55))
```

```
User Model: Adding Proposition
confidence_threshold(intersection,6)
```

```
=====
Understanding
=====
```

```
-----
Plan Recognizer
-----
```

```
Actions = s-suggest(p1,V1)
          V1=s-attrib-rel(entity(1,_389343),_389354,_389357^_389360^has(_389357,_389360))
          s-refer(_389354)
          s-attrib(_389354,_389375^category(_389375,sign))
```

Initial Setup

Adding inactive edge:

```
Head: s-suggest(p1,V1)
      V1=s-attrib-rel(entity(1,_389847),_389843,_389849^_389852^has(_389849,_389852))
      s-refer(_389843)
      s-attrib(_389843,_389867^category(_389867,sign))
```

```
Acts: s-suggest(p1,V1)
      V1=s-attrib-rel(entity(1,_389847),_389843,_389849^_389852^has(_389849,_389852))
      s-refer(_389843)
      s-attrib(_389843,_389867^category(_389867,sign))
```


Adding active edge:
Head: suggest-expand-plan(_390802)
Need: s-suggest(_390802,_390871)

Adding config (from active edge):
Active: suggest-expand-plan(_390802)
Inactive: s-suggest(p1,V1)
 V1=s-attrib-rel(entity(1,_389847),_389843,_389849^_389852^has(_389849,_389852))
 s-refer(_389843)
 s-attrib(_389843,_389867^category(_389867,sign))

End of Initial Setup

Applying config (0 left, step 1)

Active: suggest-expand-plan(_390802)
Inactive: s-suggest(p1,V1)
 V1=s-attrib-rel(entity(1,_389847),_389843,_389849^_389852^has(_389849,_389852))
 s-refer(_389843)
 s-attrib(_389843,_389867^category(_389867,sign))

Adding inactive edge:
Head: suggest-expand-plan(p1)
Acts: s-suggest(p1,V1)
 V1=s-attrib-rel(entity(1,_392105),_392101,_392107^_392110^has(_392107,_392110))
 s-refer(_392101)
 s-attrib(_392101,_392125^category(_392125,sign))

*** Agenda Empty ***

number of plans found: 2
Number of complete plans found: 1

Consider Plan Derivation

suggest-expand-plan(p1)
 +-salience_suggest_actions(p1,_394668,_394700,[s-attrib-rel(entity(1,_395003),_394999,_395005^
 | - _395008^has(_395005,_395008)),s-refer(_394999),s-attrib(_394999,_395023^category(_395023,sign))]
 | -)
 +-s-suggest(p1,V1)
 V1=s-attrib-rel(entity(1,_394720),_394716,_394722^_394725^has(_394722,_394725))
 s-refer(_394716)
 s-attrib(_394716,_394740^category(_394740,sign))

Evaluate

<con> error(p1,p20,_394675)
<con> constraint(p1,_394680,p55)
<con> yield(p1,p53,[])
<con> content(p1,p53,_394693)
<con> modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
 - ,3,3)=modifiers(_394700,_394701,_394702,_394703,_394704)
<ma> salience_suggest_actions(p1,p20,entity(1,inter2),[s-attrib-rel(entity(1,_401889),_401885,

```
- _401891^_401894^has(_401891,_401894)),s-refer(_401885),s-attrib(_401885,_401909^category(
- _401909,sign))]]
```

Inferred Plan

```
_395736:suggest-expand-plan(p1)
+_-395781:saliience_suggest_actions(p1,p20,entity(1,inter2),[s-attrib-rel(entity(1,inter2),entity(
| - _404541,_404542),_404544^_404547^has(_404544,_404547)),s-refer(entity(_404541,_404542)),s-attrib
| - (entity(_404541,_404542),_404568^category(_404568,sign))]))
+_-395786:s-suggest(p1,V1)
  V1=s-attrib-rel(entity(1,inter2),entity(_402805,_402806),_394722^_394725^has(_394722,_394725))
    s-refer(entity(_402805,_402806))
    s-attrib(entity(_402805,_402806),_394740^category(_394740,sign))
```

User Model: Adding Proposition

```
plan(user,p91,mb(system,user,suggest(p1,p20,[s-attrib-rel(entity(1,inter2),entity(_407825,
- _407826),_407828^_407831^has(_407828,_407831)),s-refer(entity(_407825,_407826)),s-attrib(entity(
- _407825,_407826),_407852^category(_407852,sign))]])))
```

```
Pushing to focus stack: focus(p91,p91,mb(system,user,suggest(p1,p20,[s-attrib-rel(entity(
- 1,inter2),entity(_411538,_411539),_411541^_411544^has(_411541,_411544)),s-refer(entity(
- _411538,_411539)),s-attrib(entity(_411538,_411539),_411565^category(_411565,sign))]])))
```

User Model: Adding Proposition

```
achieve(p91,p91,mb(system,user,suggest(p1,p20,[s-attrib-rel(entity(1,inter2),entity(_412407,
- _412408),_412410^_412413^has(_412410,_412413)),s-refer(entity(_412407,_412408)),s-attrib(entity(
- _412407,_412408),_412434^category(_412434,sign))]])))
```

```
=====
Checking Acceptance and Collaborative Rules
=====
```

Applying m_accept_rule1

```
Popping from focus stack: focus(p91,p91,mb(system,user,suggest(p1,p20,[s-attrib-rel(entity(
- 1,inter2),entity(_414086,_414087),_414089^_414092^has(_414089,_414092)),s-refer(entity(
- _414086,_414087)),s-attrib(entity(_414086,_414087),_414113^category(_414113,sign))]])))
```

User Model: Adding Proposition

```
mb(system,user,suggest(p1,p20,[s-attrib-rel(entity(1,inter2),entity(_414880,_414881),_414883^
- _414886^has(_414883,_414886)),s-refer(entity(_414880,_414881)),s-attrib(entity(_414880,
- _414881),_414907^category(_414907,sign))]])))
```

B.4 Constructing “Yes, it does, and it also has traffic lights.”

```
=====
Checking Goal Rules
=====
```

Applying g_rule2

```
goal(system,mb(system,user,replace(p1,_213560)))
```

```
=====
Responding
=====
```

```
Goal : mb(system,user,replace(p1,_213560))
Effect: bel(user,goal(system,mb(system,user,replace(p1,_213560)))
```

Construct

Initial Setup

```
Trying: replace-plan(p1)
<con>error(p1,p20,_214131)
<con>constraint(p1,_214136,p55)
<con>step(p1,_214142,p53)
<con>content(p1,p39,_214149)
<con>modifiers(entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],1,3)=modifier(
  - _214156,_214157,_214158)
*** failed ***
Trying: expand-plan(p1)
<con>error(p1,p20,_214131)
<con>constraint(p1,_214136,p55)
<con>yield(p1,p53,[])
<con>content(p1,p53,_214149)
<con>modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)],
  - 3,3)=modifiers(_214156,_214157,_214158,_214159,_214159)
<con>length([inter2],_214165)
<con>>(1,1)
*** failed ***
Trying: expand-plan(p1)
<con>error(p1,p20,_214131)
<con>constraint(p1,_214136,p55)
<con>yield(p1,p53,[])
<con>content(p1,p53,_214149)
<con>modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)],
  - 3,3)=modifiers(_214156,_214157,_214158,_214159,_214159)
<con>not(confidence_exceed(entity(1,inter2),3))
<con>suggest(p1,p20,_214173)
New edge added
Trying: expand-plan(p1)
<con>error(p1,p20,_214131)
<con>constraint(p1,_214136,p55)
<con>yield(p1,p53,[])
<con>content(p1,p53,_214149)
<con>modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)],
  - 3,3)=modifiers(_214156,_214157,_214158,_214159,_214159)
<con>not(confidence_exceed(entity(1,inter2),3))
<con>not(suggest(p1,p20,_214175))
*** failed ***
```

End of Initialization

Expanding (step 0 active 1)

```
Head: expand-plan(p1)
Need: construct(modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,
  - intersection)],3,_214111),_214103,V1,_214105)
V1=s-attrib-rel(entity(1,inter2),entity(_214137,_214138),_214140^_214143^has(_214140,
  - _214143))
s-refer(entity(_214137,_214138))
s-attrib(entity(_214137,_214138),_214164^category(_214164,sign))
```

Invoking construct recursively

Construct

Initial Setup

Trying: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection
-)],3,_214111)
New edge added
Trying: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection
-)],3,3)
<con>[inter2]=[inter2]
<con>confidence_exceed(entity(1,inter2),3)
*** failed ***

End of Initialization

Expanding (step 0 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_216273)
Need: modifier(entity(1,inter2),[inter2],_216233,[called(inter2,Lowell Street),category(inter2,
- intersection)],_216235,_216236)
Trying: modifier(entity(1,inter2),[inter2],_216233,[called(inter2,Lowell Street),category(inter2,
- intersection)],_216235,_216236)
New edge added
Trying: modifier(entity(1,inter2),[inter2],_216233,[called(inter2,Lowell Street),category(inter2,
- intersection)],_216235,_216236)
New edge added

Expanding (step 1 active 2)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_217512)
Need: salient_attrib(entity(1,inter2),_217428,[called(inter2,Lowell Street),category(inter2,
- intersection)],_217430)
<ma> salient_attrib(entity(1,inter2),_217428,[called(inter2,Lowell Street),category(inter2,
- intersection)],_217430)
*** failed ***
No edges added

Expanding (step 2 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_217288)
Need: salient_attrib_rel(entity(1,inter2),_217180,_217181,[called(inter2,Lowell Street),category(
- inter2,intersection)],_217183)
<ma> salient_attrib_rel(entity(1,inter2),_217180,_217181,[called(inter2,Lowell Street),category(inter2
- ,intersection)],_217183)
New edge added

Expanding (step 3 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_219301)
Need: s-attrib-rel(entity(1,inter2),entity(4,lights1),_219188^_219191^has(_219188,_219191))

Trying: s-attrib-rel(entity(1,inter2),entity(4,lights1),_219188^_219191^has(_219188,_219191))

<con>has(inter2,lights1)

New edge added

Expanding (step 4 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_220716)

Need: ref(entity(4,lights1),_220619)

<ma> ref(entity(4,lights1),_220619)

New edge added

Expanding (step 5 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_222247)

Need: subset([inter2],_222167^ab(system,user,apply(apply(_222180^_222183^has(_222180,_222183),
- _222167),lights1)),_222163)

<ma> subset([inter2],_222167^ab(system,user,apply(apply(_222180^_222183^has(_222180,_222183),
- _222167),lights1)),_222163)

New edge added

Expanding (step 6 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_223914)

Need: refer(entity(4,lights1),_223863)

Trying: refer(entity(4,lights1),_223863)

New edge added

Expanding (step 7 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_225436)

Need: s-refer(entity(4,lights1))

Trying: s-refer(entity(4,lights1))

New edge added

Expanding (step 8 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_227098)

Need: describe(entity(4,lights1),_227047)

Trying: describe(entity(4,lights1),_227047)

New edge added

Expanding (step 9 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_228831)

Need: context_current(_228753)

<ma> context_current(_228753)

New edge added

Expanding (step 10 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_231704)

Need: headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],entity(

```

- 4,lights1),_231618,_231619,_231620)
Trying: headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],entity(
- 4,lights1),_231618,_231619,_231620)
New edge added

Expanding (step 11 active 1)
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_233883)
Need: s-attrib(entity(4,lights1),_233739^category(_233739,_233743))
Trying: s-attrib(entity(4,lights1),_233739^category(_233739,_233743))
<con>category(lights1,_233743)
New edge added

Expanding (step 12 active 1)
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_236192)
Need: subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],_236082^ab(system,
- user,category(_236082,traffic_lights)),_236062)
<ma> subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],_236082^ab(system,
- user,category(_236082,traffic_lights)),_236062)
New edge added

Expanding (step 13 active 1)
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_238825)
Need: ref(entity(4,lights1),_238730)
<ma> ref(entity(4,lights1),_238730)
New edge added

Expanding (step 14 active 1)
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_241248)
Need: _241164=[category(lights1,traffic_lights)]
<ma> _241164=[category(lights1,traffic_lights)]
New edge added

Expanding (step 15 active 1)
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_243651)
Need: confidence_headnoun(_243576,entity(4,lights1),traffic_lights)
<ma> confidence_headnoun(_243576,entity(4,lights1),traffic_lights)
New edge added

Expanding (step 16 active 1)
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_247119)
Need: modifiers(entity(4,lights1),[lights1],[category(lights1,traffic_lights)],2,_247061)
Trying: modifiers(entity(4,lights1),[lights1],[category(lights1,traffic_lights)],2,_247061)
New edge added
Trying: modifiers(entity(4,lights1),[lights1],[category(lights1,traffic_lights)],2,2)
<con>[lights1]=[lights1]
<con>confidence_exceed(entity(4,lights1),2)
New edge added

```

Expanding (step 17 active 2)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_249621)
Need: null
New edge added

Expanding (step 18 active 2)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_250450)
Need: modifier(entity(4,lights1),[lights1],_250364,[category(lights1,traffic_lights)],_250366,
- _250367)
Trying: modifier(entity(4,lights1),[lights1],_250364,[category(lights1,traffic_lights)],_250366,
- _250367)
New edge added
Trying: modifier(entity(4,lights1),[lights1],_250364,[category(lights1,traffic_lights)],_250366,
- _250367)
New edge added

Expanding (step 19 active 3)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_252857)
Need: confidence_attr_rel(_252817,entity(1,inter2),entity(4,lights1),_252828^_252831^has(
- _252828,_252831))
<ma> confidence_attr_rel(_252817,entity(1,inter2),entity(4,lights1),_252828^_252831^has(
- _252828,_252831))
New edge added

Expanding (step 20 active 3)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_256555)
Need: salient_attr(entity(4,lights1),_256425,[category(lights1,traffic_lights)],_256427)
<ma> salient_attr(entity(4,lights1),_256425,[category(lights1,traffic_lights)],_256427)
*** failed ***
No edges added

Expanding (step 21 active 2)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_255658)
Need: salient_attr_rel(entity(4,lights1),_255504,_255505,[category(lights1,traffic_lights)],
- _255507)
<ma> salient_attr_rel(entity(4,lights1),_255504,_255505,[category(lights1,traffic_lights)],
- _255507)
*** failed ***
No edges added

Expanding (step 22 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_259150)
Need: confidence_add(_259136,3,3)
<ma> confidence_add(_259136,3,3)
New edge added

```

Expanding (step 23 active 1)
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_263513)
Need: modifiers(entity(1,inter2),[inter2],[has(inter2,lights1),called(inter2,Lowell Street),category(
- inter2,intersection)],6,_263513)
Trying: modifiers(entity(1,inter2),[inter2],[has(inter2,lights1),called(inter2,Lowell Street),category
- (inter2,intersection)],6,_263513)
New edge added
Trying: modifiers(entity(1,inter2),[inter2],[has(inter2,lights1),called(inter2,Lowell Street),category
- (inter2,intersection)],6,6)
<con>[inter2]=[inter2]
<con>confidence_exceed(entity(1,inter2),6)
*** failed ***

```

```

Expanding (step 24 active 1)
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_266214)
Need: modifier(entity(1,inter2),[inter2],_266169,[has(inter2,lights1),called(inter2,Lowell Street),
- category(inter2,intersection)],_266171,_266172)
Trying: modifier(entity(1,inter2),[inter2],_266169,[has(inter2,lights1),called(inter2,Lowell Street),
- category(inter2,intersection)],_266171,_266172)
New edge added
Trying: modifier(entity(1,inter2),[inter2],_266169,[has(inter2,lights1),called(inter2,Lowell Street),
- category(inter2,intersection)],_266171,_266172)
New edge added

```

```

Expanding (step 25 active 2)
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_270073)
Need: salient_attrib(entity(1,inter2),_269984,[has(inter2,lights1),called(inter2,Lowell Street),
- category(inter2,intersection)],_269986)
<ma> salient_attrib(entity(1,inter2),_269984,[has(inter2,lights1),called(inter2,Lowell Street),
- category(inter2,intersection)],_269986)
*** failed ***
No edges added

```

```

Expanding (step 26 active 1)
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_269138)
Need: salient_attrib_rel(entity(1,inter2),_269025,_269026,[has(inter2,lights1),called(inter2,
- Lowell Street),category(inter2,intersection)],_269028)
<ma> salient_attrib_rel(entity(1,inter2),_269025,_269026,[has(inter2,lights1),called(inter2,
- Lowell Street),category(inter2,intersection)],_269028)
New edge added

```

```

Expanding (step 27 active 1)
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_273830)
Need: s-attrib-rel(entity(1,inter2),entity(6,sign1),_273717^_273720^has(_273717,_273720))
Trying: s-attrib-rel(entity(1,inter2),entity(6,sign1),_273717^_273720^has(_273717,_273720))
<con>has(inter2,sign1)
New edge added

```

```

Expanding (step 28 active 1)

```



```
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_277151)
Need: ref(entity(6,sign1),_277054)
<ma> ref(entity(6,sign1),_277054)
New edge added
```

Expanding (step 29 active 1)

```
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_281634)
Need: subset([inter2],_281554^ab(system,user,apply(apply(_281567^_281570^has(_281567,_281570),
- _281554),sign1)),_281550)
<ma> subset([inter2],_281554^ab(system,user,apply(apply(_281567^_281570^has(_281567,_281570),
- _281554),sign1)),_281550)
New edge added
```

Expanding (step 30 active 1)

```
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_285211)
Need: refer(entity(6,sign1),_285160)
Trying: refer(entity(6,sign1),_285160)
New edge added
```

Expanding (step 31 active 1)

```
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_288643)
Need: s-refer(entity(6,sign1))
Trying: s-refer(entity(6,sign1))
New edge added
```

Expanding (step 32 active 1)

```
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_292215)
Need: describe(entity(6,sign1),_292164)
Trying: describe(entity(6,sign1),_292164)
New edge added
```

Expanding (step 33 active 1)

```
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_296901)
Need: context_current(_296823)
<ma> context_current(_296823)
New edge added
```

Expanding (step 34 active 1)

```
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_300630)
Need: headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],entity(
- 6,sign1),_300544,_300545,_300546)
Trying: headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],entity(
- 6,sign1),_300544,_300545,_300546)
New edge added
```

Expanding (step 35 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_304719)

Need: s-attrib(entity(6,sign1),_304575^category(_304575,_304579))

Trying: s-attrib(entity(6,sign1),_304575^category(_304575,_304579))

<con>category(sign1,_304579)

New edge added

Expanding (step 36 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_308938)

Need: subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],_308828^ab(system,
- user,category(_308828,sign)),_308808)

<ma> subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],_308828^ab(system,
- user,category(_308828,sign)),_308808)

New edge added

Expanding (step 37 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_314532)

Need: ref(entity(6,sign1),_314437)

<ma> ref(entity(6,sign1),_314437)

New edge added

Expanding (step 38 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_318865)

Need: _318781=[category(sign1,sign)]

<ma> _318781=[category(sign1,sign)]

New edge added

Expanding (step 39 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_323178)

Need: confidence_headnoun(_323103,entity(6,sign1),sign)

<ma> confidence_headnoun(_323103,entity(6,sign1),sign)

New edge added

Expanding (step 40 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_328556)

Need: modifiers(entity(6,sign1),[sign1],[category(sign1,sign)],1,_328498)

Trying: modifiers(entity(6,sign1),[sign1],[category(sign1,sign)],1,_328498)

New edge added

Trying: modifiers(entity(6,sign1),[sign1],[category(sign1,sign)],1,1)

<con>[sign1]=[sign1]

<con>confidence_exceed(entity(6,sign1),1)

New edge added

Expanding (step 41 active 2)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_332968)

Need: null
New edge added

Expanding (step 42 active 2)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_334523)

Need: modifier(entity(6,sign1),[sign1],_334437,[category(sign1,sign)],_334439,_334440)
Trying: modifier(entity(6,sign1),[sign1],_334437,[category(sign1,sign)],_334439,_334440)
New edge added

Trying: modifier(entity(6,sign1),[sign1],_334437,[category(sign1,sign)],_334439,_334440)
New edge added

Expanding (step 43 active 3)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_338840)

Need: confidence_attr_rel(_338800,entity(1,inter2),entity(6,sign1),_338811^_338814^has(
- _338811,_338814))

<ma> confidence_attr_rel(_338800,entity(1,inter2),entity(6,sign1),_338811^_338814^has(_338811,
- _338814))

New edge added

Expanding (step 44 active 3)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_346214)

Need: salient_attr(entity(6,sign1),_346084,[category(sign1,sign)],_346086)
<ma> salient_attr(entity(6,sign1),_346084,[category(sign1,sign)],_346086)

*** failed ***

No edges added

Expanding (step 45 active 2)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_344591)

Need: salient_attr_rel(entity(6,sign1),_343395,_343396,[category(sign1,sign)],_343398)
<ma> salient_attr_rel(entity(6,sign1),_343395,_343396,[category(sign1,sign)],_343398)

*** failed ***

No edges added

Expanding (step 46 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_350717)

Need: confidence_add(_350703,6,2)
<ma> confidence_add(_350703,6,2)

New edge added

Expanding (step 47 active 1)

Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
- ,3,_355940)

Need: modifiers(entity(1,inter2),[inter2],[has(inter2,sign1),has(inter2,lights1),called(inter2,
- Lowell Street),category(inter2,intersection)],8,_355940)

Trying: modifiers(entity(1,inter2),[inter2],[has(inter2,sign1),has(inter2,lights1),called(inter2,
- Lowell Street),category(inter2,intersection)],8,_355940)

New edge added

Trying: modifiers(entity(1,inter2),[inter2],[has(inter2,sign1),has(inter2,lights1),called(inter2,

```
    - Lowell Street),category(inter2,intersection)],8,8)
<con>[inter2]=[inter2]
<con>confidence_exceed(entity(1,inter2),8)
New edge added
```

Expanding (step 48 active 2)

```
-----
Head: modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
    - ,3,8)
Need: null
New edge added
```

Returning from recursive call to construct

Expanding (step 1 active 1)

```
-----
Head: expand-plan(p1)
Need: substitute(p1,p53,V1,_216120,V2)
    V1=modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,
        - intersection)],3,8)
    +-modifier(entity(1,inter2),[inter2],[inter2],[called(inter2,Lowell Street),category(inter2,
    | - intersection)],[has(inter2,lights1),called(inter2,Lowell Street),category(inter2,
    | - intersection)],3)
    | +-salient_attr_rel(entity(1,inter2),entity(4,lights1),_216225^_216228^has(_216225,
    | | - _216228),[called(inter2,Lowell Street),category(inter2,intersection)],[has(inter2,
    | | - lights1),called(inter2,Lowell Street),category(inter2,intersection)])
    | +-s-attr_rel(entity(1,inter2),entity(4,lights1),_216225^_216228^has(_216225,
    | | - _216228))
    | +-ref(entity(4,lights1),lights1)
    | +-subset([inter2],_216349^ab(system,user,apply(apply(_216225^_216228^has(_216225,
    | | - _216228),_216349),lights1)),[inter2])
    | +-refer(entity(4,lights1),2)
    | | +-s-refer(entity(4,lights1))
    | | +-describe(entity(4,lights1),2)
    | | | +-context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2])
    | | | +-headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],entity(
    | | | | - 4,lights1),[lights1],[category(lights1,traffic_lights)],2)
    | | | | +-s-attr(entity(4,lights1),_216523^category(_216523,traffic_lights))
    | | | | +-subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
    | | | | | - _216523^ab(system,user,category(_216523,traffic_lights)),[lights1])
    | | | | +-ref(entity(4,lights1),lights1)
    | | | | +-[category(lights1,traffic_lights)]=[category(lights1,traffic_lights)]
    | | | | +-confidence_headnoun(2,entity(4,lights1),traffic_lights)
    | | | +-modifiers(entity(4,lights1),[lights1],[category(lights1,traffic_lights)],
    | | | - 2,2)
    | | | +-null
    | +-confidence_attr_rel(3,entity(1,inter2),entity(4,lights1),_216225^_216228^has(
    | - _216225,_216228))
    +-confidence_add(6,3,3)
    +-modifiers(entity(1,inter2),[inter2],[has(inter2,lights1),called(inter2,Lowell Street),
        - category(inter2,intersection)],6,8)
    +-modifier(entity(1,inter2),[inter2],[inter2],[has(inter2,lights1),called(inter2,
    | - Lowell Street),category(inter2,intersection)],[has(inter2,sign1),has(inter2,lights1),
    | - called(inter2,Lowell Street),category(inter2,intersection)],2)
    | +-salient_attr_rel(entity(1,inter2),entity(6,sign1),_216849^_216852^has(_216849,
    | | - _216852),[has(inter2,lights1),called(inter2,Lowell Street),category(inter2,
    | | - intersection)],[has(inter2,sign1),has(inter2,lights1),called(inter2,Lowell Street),
    | | - category(inter2,intersection)])
    | +-s-attr_rel(entity(1,inter2),entity(6,sign1),_216849^_216852^has(_216849,
```

```

| | - _216852))
| +-ref(entity(6,sign1),sign1)
| +-subset([inter2],_216983^ab(system,user,apply(apply(_216849^_216852^has(_216849,
| | - _216852),_216983),sign1)),[inter2])
| +-refer(entity(6,sign1),1)
| | +-s-refer(entity(6,sign1))
| | +-describe(entity(6,sign1),1)
| |   +-context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2
| |   | - ])
| |   +-headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| |   | - entity(6,sign1),[sign1],[category(sign1,sign)],1)
| |   | +-s-attrib(entity(6,sign1),_217157^category(_217157,sign))
| |   | +-subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| |   | | - _217157^ab(system,user,category(_217157,sign)),[sign1])
| |   | +-ref(entity(6,sign1),sign1)
| |   | +-[category(sign1,sign)]=[category(sign1,sign)]
| |   | +-confidence_headnoun(1,entity(6,sign1),sign)
| |   +-modifiers(entity(6,sign1),[sign1],[category(sign1,sign)],1,1)
| |     +-null
| +-confidence_attrib_rel(2,entity(1,inter2),entity(6,sign1),_216849^_216852^has(
|   - _216849,_216852))
+-confidence_add(8,6,2)
+-modifiers(entity(1,inter2),[inter2],[has(inter2,sign1),has(inter2,lights1),called(inter2,
- Lowell Street),category(inter2,intersection)],8,8)
+-null
V2=s-attrib(entity(6,sign1),_217157^category(_217157,sign))
s-refer(entity(6,sign1))
s-attrib-rel(entity(1,inter2),entity(6,sign1),_216849^_216852^has(_216849,_216852))
s-attrib(entity(4,lights1),_216523^category(_216523,traffic_lights))
s-refer(entity(4,lights1))
s-attrib-rel(entity(1,inter2),entity(4,lights1),_216225^_216228^has(_216225,_216228))
<ma> substitute(p1,p53,V1,_216120,V2)
V1=modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,
- intersection)],3,8)
+-modifier(entity(1,inter2),[inter2],[inter2],[called(inter2,Lowell Street),category(inter2,
| - intersection)],[has(inter2,lights1),called(inter2,Lowell Street),category(inter2,
| - intersection)],3)
| +-salient_attrib_rel(entity(1,inter2),entity(4,lights1),_216225^_216228^has(_216225,
| | - _216228),[called(inter2,Lowell Street),category(inter2,intersection)],[has(inter2,
| | - lights1),called(inter2,Lowell Street),category(inter2,intersection)])
| +-s-attrib-rel(entity(1,inter2),entity(4,lights1),_216225^_216228^has(_216225,
| | - _216228))
| +-ref(entity(4,lights1),lights1)
| +-subset([inter2],_216349^ab(system,user,apply(apply(_216225^_216228^has(_216225,
| | - _216228),_216349),lights1)),[inter2])
| +-refer(entity(4,lights1),2)
| | +-s-refer(entity(4,lights1))
| | +-describe(entity(4,lights1),2)
| |   +-context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2])
| |   +-headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],entity(
| |   | - 4,lights1),[lights1],[category(lights1,traffic_lights)],2)
| |   | +-s-attrib(entity(4,lights1),_216523^category(_216523,traffic_lights))
| |   | +-subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| |   | | - _216523^ab(system,user,category(_216523,traffic_lights)),[lights1])
| |   | +-ref(entity(4,lights1),lights1)
| |   | +-[category(lights1,traffic_lights)]=[category(lights1,traffic_lights)]
| |   | +-confidence_headnoun(2,entity(4,lights1),traffic_lights)
| |   +-modifiers(entity(4,lights1),[lights1],[category(lights1,traffic_lights)],
| |   - 2,2)

```

```

| | +-null
| +-confidence_attrib_rel(3,entity(1,inter2),entity(4,lights1),_216225^_216228^has(
|   - _216225,_216228))
+-confidence_add(6,3,3)
+-modifiers(entity(1,inter2),[inter2],[has(inter2,lights1),called(inter2,Lowell Street),
  - category(inter2,intersection)],6,8)
+-modifier(entity(1,inter2),[inter2],[inter2],[has(inter2,lights1),called(inter2,
| - Lowell Street),category(inter2,intersection)],[has(inter2,sign1),has(inter2,lights1),
| - called(inter2,Lowell Street),category(inter2,intersection)],2)
| +-salient_attrib_rel(entity(1,inter2),entity(6,sign1),_216849^_216852^has(_216849,
| | - _216852),[has(inter2,lights1),called(inter2,Lowell Street),category(inter2,
| | - intersection)],[has(inter2,sign1),has(inter2,lights1),called(inter2,Lowell Street),
| | - category(inter2,intersection)])
| +-s-attr-rel(entity(1,inter2),entity(6,sign1),_216849^_216852^has(_216849,
| | - _216852))
| +-ref(entity(6,sign1),sign1)
| +-subset([inter2],_216983^ab(system,user,apply(apply(_216849^_216852^has(_216849,
| | - _216852),_216983),sign1)),[inter2])
| +-refer(entity(6,sign1),1)
| | +-s-refer(entity(6,sign1))
| | +-describe(entity(6,sign1),1)
| |   +-context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2
| |   | - ])
| |   +-headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| |   | - entity(6,sign1),[sign1],[category(sign1,sign)],1)
| |   | +-s-attr(entity(6,sign1),_217157^category(_217157,sign))
| |   | +-subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| |   | | - _217157^ab(system,user,category(_217157,sign)),[sign1])
| |   | +-ref(entity(6,sign1),sign1)
| |   | +-[category(sign1,sign)]=[category(sign1,sign)]
| |   | +-confidence_headnoun(1,entity(6,sign1),sign)
| |   +-modifiers(entity(6,sign1),[sign1],[category(sign1,sign)],1,1)
| |   +-null
| +-confidence_attrib_rel(2,entity(1,inter2),entity(6,sign1),_216849^_216852^has(
|   - _216849,_216852))
+-confidence_add(8,6,2)
+-modifiers(entity(1,inter2),[inter2],[has(inter2,sign1),has(inter2,lights1),called(inter2,
  - Lowell Street),category(inter2,intersection)],8,8)
+-null
V2=s-attr(entity(6,sign1),_217157^category(_217157,sign))
s-refer(entity(6,sign1))
s-attr-rel(entity(1,inter2),entity(6,sign1),_216849^_216852^has(_216849,_216852))
s-attr(entity(4,lights1),_216523^category(_216523,traffic_lights))
s-refer(entity(4,lights1))
s-attr-rel(entity(1,inter2),entity(4,lights1),_216225^_216228^has(_216225,_216228))

```

New edge added

Expanding (step 2 active 1)

Head: expand-plan(p1)

Need: evaluate(V1)

```

V1=_238042:describe-route(_238054)
+-_238096:directions(_238085,_238078,_238092)
+-_238124:direction(_238085,_238119,_238138)
| +-_238168:ref(entity(1,inter2),_238161)
| +-_238179:s-goto(entity(1,inter2))
| +-_238251:set_context(_238148,_238161,_238149,_238150)
| +-_238261:refer(entity(1,inter2),8)
| | +-_238295:s-refer(entity(1,inter2))

```

```

| | +-_238314:describe(entity(1,inter2),8)
| |   +-_238334:context_current(_238337)
| |   +-_238341:headnoun(_238337,entity(1,inter2),_238355,_238356,_238357)
| |   | +-_238378:s-attrib(entity(1,inter2),_238396^category(_238396,intersection))
| |   | +-_238455:subset(_238337,_238396^ab(_238367,_238374,category(_238396,intersection))
| |   | | - ,_238355)
| |   | +-_238474:ref(entity(1,inter2),_238478)
| |   | +-_238485:_238356=[category(_256867,intersection)]
| |   | +-_238498:confidence_headnoun(_238357,entity(1,inter2),intersection)
| | +-_238510:modifiers(entity(1,inter2),_238355,_238356,_238357,8)
| |   +-_238533:modifier(entity(1,inter2),_238355,[inter2],_238356,[called(inter2,
| |     | - Lowell Street),category(inter2,intersection)],_238550)
| |   +-_238583:salient_attrib(entity(1,inter2),_238594^called(_238594,Lowell Street),
| |     | | - _238356,[called(inter2,Lowell Street),category(inter2,intersection)])
| |   +-_238612:s-attrib(entity(1,inter2),_238594^called(_238594,Lowell Street))
| |   +-_238689:subset(_238355,_238696^ab(_238572,_238579,apply(_238594^called(
| |     | | - _238594,Lowell Street),_238696)),[inter2])
| |   +-_238716:confidence_attrib(_238550,entity(1,inter2),_238594^called(
| |     | - _238594,Lowell Street))
| | +-_238734:confidence_add(3,_238357,_238550)
| | +-_238743:modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),
| |   - category(inter2,intersection)],3,8)
| | +-_238778:modifier(entity(1,inter2),[inter2],[inter2],[called(inter2,
| |   | - Lowell Street),category(inter2,intersection)],[has(inter2,lights1),called(
| |   | - inter2,Lowell Street),category(inter2,intersection)],3)
| |   +-_238845:salient_attrib_rel(entity(1,inter2),entity(4,lights1),_238860^
| |     | | - _238863^has(_238860,_238863),[called(inter2,Lowell Street),category(inter2
| |     | | - ,intersection)],[has(inter2,lights1),called(inter2,Lowell Street),category
| |     | | - (inter2,intersection)])
| |   +-_238896:s-attrib-rel(entity(1,inter2),entity(4,lights1),_238860^
| |     | | - _238863^has(_238860,_238863))
| |   +-_238991:ref(entity(4,lights1),lights1)
| |   +-_239002:subset([inter2],_239011^ab(system,user,apply(apply(_238860^
| |     | | - _238863^has(_238860,_238863),_239011),lights1)),[inter2])
| |   +-_239037:refer(entity(4,lights1),2)
| |   +-_239071:s-refer(entity(4,lights1))
| |   +-_239090:describe(entity(4,lights1),2)
| |     +-_239110:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,
| |       | - sign1,street1,street2])
| |     +-_239135:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| |       | - street1,street2],entity(4,lights1),[lights1],[category(lights1,
| |       | - traffic_lights)],2)
| |     +-_239197:s-attrib(entity(4,lights1),_239215^category(_239215,
| |       | - traffic_lights))
| |     +-_239274:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| |       | - street1,street2],_239215^ab(system,user,category(_239215,
| |       | - traffic_lights)),[lights1])
| |     +-_239313:ref(entity(4,lights1),lights1)
| |     +-_239324:[category(lights1,traffic_lights)]=[category(lights1,
| |       | - traffic_lights)]
| |     +-_239342:confidence_headnoun(2,entity(4,lights1),traffic_lights)
| |     +-_239354:modifiers(entity(4,lights1),[lights1],[category(lights1,
| |       | - traffic_lights)],2,2)
| |     +-_239418:null
| |   +-_239441:confidence_attrib_rel(3,entity(1,inter2),entity(4,lights1),
| |     | - _238860^_238863^has(_238860,_238863))
| | +-_239466:confidence_add(6,3,3)
| | +-_239475:modifiers(entity(1,inter2),[inter2],[has(inter2,lights1),called(inter2,
| |   - Lowell Street),category(inter2,intersection)],6,8)

```

```

| | +-_239515:modifier(entity(1,inter2),[inter2],[inter2],[has(inter2,lights1),
| | | - called(inter2,Lowell Street),category(inter2,intersection)],[has(inter2,
| | | - sign1),has(inter2,lights1),called(inter2,Lowell Street),category(inter2,
| | | - intersection)],2)
| | +-_239592:salient_attrib_rel(entity(1,inter2),entity(6,sign1),_239607^
| | | - _239610^has(_239607,_239610),[has(inter2,lights1),called(inter2,
| | | - Lowell Street),category(inter2,intersection)],[has(inter2,sign1),has(
| | | - inter2,lights1),called(inter2,Lowell Street),category(inter2,
| | | - intersection)])
| | +-_239653:s-attrib-rel(entity(1,inter2),entity(6,sign1),_239607^
| | | - _239610^has(_239607,_239610))
| | +-_239748:ref(entity(6,sign1),sign1)
| | +-_239759:subset([inter2],_239768^ab(system,user,apply(apply(_239607^
| | | - _239610^has(_239607,_239610),_239768),sign1)),[inter2])
| | +-_239794:refer(entity(6,sign1),1)
| | +-_239828:s-refer(entity(6,sign1))
| | +-_239847:describe(entity(6,sign1),1)
| | | +-_239867:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,
| | | | - sign1,street1,street2])
| | | +-_239892:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| | | | - street1,street2],entity(6,sign1),[sign1],[category(sign1,sign)],
| | | | - 1)
| | | | +-_239954:s-attrib(entity(6,sign1),_239972^category(_239972,sign))
| | | | +-_240031:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| | | | | - street1,street2],_239972^ab(system,user,category(_239972,sign)),[
| | | | | - sign1])
| | | | +-_240070:ref(entity(6,sign1),sign1)
| | | | +-_240081:[category(sign1,sign)]=[category(sign1,sign)]
| | | | +-_240099:confidence_headnoun(1,entity(6,sign1),sign)
| | | | +-_240111:modifiers(entity(6,sign1),[sign1],[category(sign1,sign)],
| | | | | - 1,1)
| | | | +-_240175:null
| | | +-_240198:confidence_attrib_rel(2,entity(1,inter2),entity(6,sign1),
| | | | - _239607^_239610^has(_239607,_239610))
| | +-_240223:confidence_add(8,6,2)
| | +-_240232:modifiers(entity(1,inter2),[inter2],[has(inter2,sign1),has(inter2,
| | | - lights1),called(inter2,Lowell Street),category(inter2,intersection)],
| | | - 8,8)
| | | +-_240311:null
| +-_240334:_238138=here(_238161,_238149,_238150)
+-_240346:directions(_238138,_238120,_238092)
+-_240380:null

```

Invoking evaluate from construct

```

-----
Evaluate
-----

```

```

<con> _238078=[_315387|_315392]
<con> here(exit1,street1,+(1))=here(_238148,_238149,_238150)
<con> _238119=goto(exit1,_238161,street1,+(1),_238164)
<ma> ref(entity(1,inter2),_238161)
<con> place(inter2,_238227,_238228)
<ma> set_context(exit1,inter2,street1,+(1))
<ma> context_current(_238337)
<con> category(inter2,intersection)
<ma> subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],_238396^ab(system,
- user,category(_238396,intersection)),_238355)

```



```

<ma> ref(entity(1,inter2),_238478)
<ma> _238356=[category(inter2,intersection)]
<ma> confidence_headnoun(_238357,entity(1,inter2),intersection)
<ma> salient_attrib(entity(1,inter2),_238594^called(_238594,Lowell Street),[category(inter2,
- intersection)], [called(inter2,Lowell Street),category(inter2,intersection)])
<con> called(inter2,Lowell Street)
<ma> subset([inter1,inter2],_238696^ab(system,user,called(_238696,Lowell Street)),[inter2])
<ma> confidence_attrib(_238550,entity(1,inter2),_238594^called(_238594,Lowell Street))
<ma> confidence_add(3,1,2)
<ma> salient_attrib_rel(entity(1,inter2),entity(4,lights1),_238860^_238863^has(_238860,_238863),[
- called(inter2,Lowell Street),category(inter2,intersection)], [has(inter2,lights1),called(
- inter2,Lowell Street),category(inter2,intersection)])
<con> has(inter2,lights1)
<ma> ref(entity(4,lights1),lights1)
<ma> subset([inter2],_239011^ab(system,user,has(_239011,lights1)),[inter2])
<ma> context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2])
<con> category(lights1,traffic_lights)
<ma> subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],_239215^ab(system,
- user,category(_239215,traffic_lights)), [lights1])
<ma> ref(entity(4,lights1),lights1)
<ma> [category(lights1,traffic_lights)]=[category(lights1,traffic_lights)]
<ma> confidence_headnoun(2,entity(4,lights1),traffic_lights)
<con> [lights1]=[lights1]
<con> confidence_exceed(entity(4,lights1),2)
<ma> confidence_attrib_rel(3,entity(1,inter2),entity(4,lights1),_238860^_238863^has(_238860,
- _238863))
<ma> confidence_add(6,3,3)
<ma> salient_attrib_rel(entity(1,inter2),entity(6,sign1),_239607^_239610^has(_239607,_239610),[has(
- inter2,lights1),called(inter2,Lowell Street),category(inter2,intersection)], [has(inter2,sign1
- ),has(inter2,lights1),called(inter2,Lowell Street),category(inter2,intersection)])
<con> has(inter2,sign1)
<ma> ref(entity(6,sign1),sign1)
<ma> subset([inter2],_239768^ab(system,user,has(_239768,sign1)),[inter2])
<ma> context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2])
<con> category(sign1,sign)
<ma> subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],_239972^ab(system,
- user,category(_239972,sign)), [sign1])
<ma> ref(entity(6,sign1),sign1)
<ma> [category(sign1,sign)]=[category(sign1,sign)]
<ma> confidence_headnoun(1,entity(6,sign1),sign)
<con> [sign1]=[sign1]
<con> confidence_exceed(entity(6,sign1),1)
<ma> confidence_attrib_rel(2,entity(1,inter2),entity(6,sign1),_239607^_239610^has(_239607,
- _239610))
<ma> confidence_add(8,6,2)
<con> [inter2]=[inter2]
<con> confidence_exceed(entity(1,inter2),8)
<ma> _238138=here(inter2,street1,+(1))
<con> here(inter2,street1,+(1))=here(inter2,street1,+(1))
<con> _238120=[]

```

Returning from call to evaluate

Expanding (step 3 active 1)

Head: expand-plan(p1)

Need: respond-to-suggestion(p1,[s-attrib-rel(entity(1,inter2),entity(_319561,_319562),_319564^
- _319567^has(_319564,_319567)),s-refer(entity(_319561,_319562)),s-attrib(entity(_319561,

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- _319562),_319588^category(_319588,sign))],[s-attrib(entity(6,sign1),_319988^category(
- _319988,sign)),s-refer(entity(6,sign1)),s-attrib-rel(entity(1,inter2),entity(6,sign1),
- _320013^_320016^has(_320013,_320016)),s-attrib(entity(4,lights1),_320030^category(
- _320030,traffic_lights)),s-refer(entity(4,lights1)),s-attrib-rel(entity(1,inter2),entity(
- 4,lights1),_320055^_320058^has(_320055,_320058)))]
Trying: respond-to-suggestion(p1,[s-attrib-rel(entity(1,inter2),entity(_367222,_367223),_367225^
- _367228^has(_367225,_367228)),s-refer(entity(_367222,_367223)),s-attrib(entity(
- _367222,_367223),_367249^category(_367249,sign))],[s-attrib(entity(6,sign1),_367649^
- category(_367649,sign)),s-refer(entity(6,sign1)),s-attrib-rel(entity(1,inter2),entity(
- 6,sign1),_367674^_367677^has(_367674,_367677)),s-attrib(entity(4,lights1),_367691^category(
- _367691,traffic_lights)),s-refer(entity(4,lights1)),s-attrib-rel(entity(1,inter2),entity(
- 4,lights1),_367716^_367719^has(_367716,_367719)))]
<con>seteq([s-attrib-rel(entity(1,inter2),entity(_368564,_368565),_368567^_368570^has(_368567,
- _368570)),s-refer(entity(_368564,_368565)),s-attrib(entity(_368564,_368565),_368591^category(
- _368591,sign))],[s-attrib(entity(6,sign1),_369009^category(_369009,sign)),s-refer(entity(
- 6,sign1)),s-attrib-rel(entity(1,inter2),entity(6,sign1),_369034^_369037^has(_369034,
- _369037)),s-attrib(entity(4,lights1),_369051^category(_369051,traffic_lights)),s-refer(entity
- (4,lights1)),s-attrib-rel(entity(1,inter2),entity(4,lights1),_369076^_369079^has(
- _369076,_369079)))]
*** failed ***
Trying: respond-to-suggestion(p1,[s-attrib-rel(entity(1,inter2),entity(_367233,_367234),_367236^
- _367239^has(_367236,_367239)),s-refer(entity(_367233,_367234)),s-attrib(entity(
- _367233,_367234),_367260^category(_367260,sign))],[s-attrib(entity(6,sign1),_367660^
- category(_367660,sign)),s-refer(entity(6,sign1)),s-attrib-rel(entity(1,inter2),entity(
- 6,sign1),_367685^_367688^has(_367685,_367688)),s-attrib(entity(4,lights1),_367702^category(
- _367702,traffic_lights)),s-refer(entity(4,lights1)),s-attrib-rel(entity(1,inter2),entity(
- 4,lights1),_367727^_367730^has(_367727,_367730)))]
<con>psubset([s-attrib-rel(entity(1,inter2),entity(_368575,_368576),_368578^_368581^has(_368578,
- _368581)),s-refer(entity(_368575,_368576)),s-attrib(entity(_368575,_368576),_368602^category(
- _368602,sign))],[s-attrib(entity(6,sign1),_369020^category(_369020,sign)),s-refer(entity(
- 6,sign1)),s-attrib-rel(entity(1,inter2),entity(6,sign1),_369045^_369048^has(_369045,
- _369048)),s-attrib(entity(4,lights1),_369062^category(_369062,traffic_lights)),s-refer(entity
- (4,lights1)),s-attrib-rel(entity(1,inter2),entity(4,lights1),_369087^_369090^has(
- _369087,_369090)))]
New edge added
Trying: respond-to-suggestion(p1,[s-attrib-rel(entity(1,inter2),entity(_367229,_367230),_367232^
- _367235^has(_367232,_367235)),s-refer(entity(_367229,_367230)),s-attrib(entity(
- _367229,_367230),_367256^category(_367256,sign))],[s-attrib(entity(6,sign1),_367656^
- category(_367656,sign)),s-refer(entity(6,sign1)),s-attrib-rel(entity(1,inter2),entity(
- 6,sign1),_367681^_367684^has(_367681,_367684)),s-attrib(entity(4,lights1),_367698^category(
- _367698,traffic_lights)),s-refer(entity(4,lights1)),s-attrib-rel(entity(1,inter2),entity(
- 4,lights1),_367723^_367726^has(_367723,_367726)))]
<con>not(subset([s-attrib-rel(entity(1,inter2),entity(_368588,_368589),_368591^_368594^has(
- _368591,_368594)),s-refer(entity(_368588,_368589)),s-attrib(entity(_368588,_368589),
- _368615^category(_368615,sign))],[s-attrib(entity(6,sign1),_369017^category(_369017,sign)),
- s-refer(entity(6,sign1)),s-attrib-rel(entity(1,inter2),entity(6,sign1),_369042^_369045^has(
- _369042,_369045)),s-attrib(entity(4,lights1),_369059^category(_369059,traffic_lights)),
- s-refer(entity(4,lights1)),s-attrib-rel(entity(1,inter2),entity(4,lights1),_369084^
- _369087^has(_369084,_369087)))]))
*** failed ***

Expanding (step 4 active 1)
-----
Head: expand-plan(p1)
Need: partition([s-attrib(entity(6,sign1),_401580^category(_401580,sign)),s-refer(entity(
- 6,sign1)),s-attrib-rel(entity(1,inter2),entity(6,sign1),_401605^_401608^has(_401605,
- _401608)),s-attrib(entity(4,lights1),_401622^category(_401622,traffic_lights)),s-refer(entity
- (4,lights1)),s-attrib-rel(entity(1,inter2),entity(4,lights1),_401647^_401650^has(
- _401647,_401650))],[s-attrib-rel(entity(1,inter2),entity(6,sign1),_402431^_402434^has(

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- _402431,_402434)),s-refer(entity(6,sign1)),s-attrib(entity(6,sign1),_402455^category(
- _402455,sign))],_367143)
<ma> partition([s-attrib(entity(6,sign1),_449752^category(_449752,sign)),s-refer(entity(6,sign1)),
- s-attrib-rel(entity(1,inter2),entity(6,sign1),_449777^_449780^has(_449777,_449780)),s-attrib(
- entity(4,lights1),_449794^category(_449794,traffic_lights)),s-refer(entity(4,lights1)),
- s-attrib-rel(entity(1,inter2),entity(4,lights1),_449819^_449822^has(_449819,_449822))],[
- s-attrib-rel(entity(1,inter2),entity(6,sign1),_450641^_450644^has(_450641,_450644)),s-refer(
- entity(6,sign1)),s-attrib(entity(6,sign1),_450665^category(_450665,sign))],_367143)

```

New edge added

Expanding (step 5 active 1)

```

-----
Head: expand-plan(p1)
Need: s-affirm(p1,V1)
    V1=s-attrib-rel(entity(1,inter2),entity(6,sign1),_449715^_449718^has(_449715,_449718))
        s-refer(entity(6,sign1))
        s-attrib(entity(6,sign1),_449739^category(_449739,sign))
Trying: s-affirm(p1,V1)
    V1=s-attrib-rel(entity(1,inter2),entity(6,sign1),_13667^_13670^has(_13667,_13670))
        s-refer(entity(6,sign1))
        s-attrib(entity(6,sign1),_13691^category(_13691,sign))

```

New edge added

Expanding (step 6 active 1)

```

-----
Head: expand-plan(p1)
Need: s-actions(p1,V1)
    V1=s-attrib(entity(4,lights1),_205938^category(_205938,traffic_lights))
        s-refer(entity(4,lights1))
        s-attrib-rel(entity(1,inter2),entity(4,lights1),_205963^_205966^has(_205963,_205966))
Trying: s-actions(p1,V1)
    V1=s-attrib(entity(4,lights1),_205938^category(_205938,traffic_lights))
        s-refer(entity(4,lights1))
        s-attrib-rel(entity(1,inter2),entity(4,lights1),_205963^_205966^has(_205963,_205966))

```

New edge added

Constructed Plan

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-----
expand-plan(p1)
+-construct(modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,
| - intersection)],3,8),V1,V2,V3)
| V1=modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
| - ,3,8)
| +-modifier(entity(1,inter2),[inter2],[inter2],[called(inter2,Lowell Street),category(inter2,
| | - intersection)],[has(inter2,lights1),called(inter2,Lowell Street),category(inter2,
| | - intersection)],3)
| | +-salient_attrib_rel(entity(1,inter2),entity(4,lights1),_271642^_271645^has(_271642,
| | | - _271645),[called(inter2,Lowell Street),category(inter2,intersection)],[has(inter2,lights1
| | | - ),called(inter2,Lowell Street),category(inter2,intersection)])
| | +-s-attrib-rel(entity(1,inter2),entity(4,lights1),_271642^_271645^has(_271642,_271645))
| | +-ref(entity(4,lights1),lights1)
| | +-subset([inter2],_272136^ab(system,user,apply(apply(_271642^_271645^has(_271642,
| | | - _271645),_272136),lights1)),[inter2])
| | +-refer(entity(4,lights1),2)
| | | +-s-refer(entity(4,lights1))
| | | +-describe(entity(4,lights1),2)
| | | | +-context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2])
| | | | +-headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],entity(

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| | | | - 4,lights1],[lights1],[category(lights1,traffic_lights)],2)
| | | | +-s-attrib(entity(4,lights1),_271617^category(_271617,traffic_lights))
| | | | +-subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| | | | | - _271617^ab(system,user,category(_271617,traffic_lights)),[lights1])
| | | | +-ref(entity(4,lights1),lights1)
| | | | +-[category(lights1,traffic_lights)]=[category(lights1,traffic_lights)]
| | | | +-confidence_headnoun(2,entity(4,lights1),traffic_lights)
| | | +-modifiers(entity(4,lights1),[lights1],[category(lights1,traffic_lights)],2,
| | | - 2)
| | | +-null
| | +-confidence_attrib_rel(3,entity(1,inter2),entity(4,lights1),_271642^_271645^has(
| | | - _271642,_271645))
+-confidence_add(6,3,3)
+-modifiers(entity(1,inter2),[inter2],[has(inter2,lights1),called(inter2,Lowell Street),category
- (inter2,intersection)],6,8)
+-modifier(entity(1,inter2),[inter2],[inter2],[has(inter2,lights1),called(inter2,Lowell Street
| - ),category(inter2,intersection)],[has(inter2,sign1),has(inter2,lights1),called(inter2,
| - Lowell Street),category(inter2,intersection)],2)
| +-salient_attrib_rel(entity(1,inter2),entity(6,sign1),_271668^_271671^has(_271668,
| | - _271671),[has(inter2,lights1),called(inter2,Lowell Street),category(inter2,intersection
| | - )],[has(inter2,sign1),has(inter2,lights1),called(inter2,Lowell Street),category(inter2,
| | - intersection)])
| +-s-attrib-rel(entity(1,inter2),entity(6,sign1),_271668^_271671^has(_271668,_271671))
| +-ref(entity(6,sign1),sign1)
| +-subset([inter2],_272770^ab(system,user,apply(apply(_271668^_271671^has(_271668,
| | - _271671),_272770),sign1)),[inter2])
| +-refer(entity(6,sign1),1)
| | +-s-refer(entity(6,sign1))
| | +-describe(entity(6,sign1),1)
| | | +-context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2])
| | | +-headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],entity(
| | | | - 6,sign1),[sign1],[category(sign1,sign)],1)
| | | | +-s-attrib(entity(6,sign1),_271692^category(_271692,sign))
| | | | +-subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| | | | | - _271692^ab(system,user,category(_271692,sign)),[sign1])
| | | | +-ref(entity(6,sign1),sign1)
| | | | +-[category(sign1,sign)]=[category(sign1,sign)]
| | | | +-confidence_headnoun(1,entity(6,sign1),sign)
| | | +-modifiers(entity(6,sign1),[sign1],[category(sign1,sign)],1,1)
| | | +-null
| | +-confidence_attrib_rel(2,entity(1,inter2),entity(6,sign1),_271668^_271671^has(
| | | - _271668,_271671))
+-confidence_add(8,6,2)
+-modifiers(entity(1,inter2),[inter2],[has(inter2,sign1),has(inter2,lights1),called(inter2,
- Lowell Street),category(inter2,intersection)],8,8)
+-null
V2=s-attrib-rel(entity(1,inter2),entity(6,sign1),_271668^_271671^has(_271668,_271671))
s-refer(entity(6,sign1))
s-attrib(entity(6,sign1),_271692^category(_271692,sign))
V3=s-attrib(entity(6,sign1),_271692^category(_271692,sign))
s-refer(entity(6,sign1))
s-attrib-rel(entity(1,inter2),entity(6,sign1),_271668^_271671^has(_271668,_271671))
s-attrib(entity(4,lights1),_271617^category(_271617,traffic_lights))
s-refer(entity(4,lights1))
s-attrib-rel(entity(1,inter2),entity(4,lights1),_271642^_271645^has(_271642,_271645))
+-substitute(p1,p53,V1,V2,V3)
| V1=modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(inter2,intersection)]
| - ,3,8)
| +-modifier(entity(1,inter2),[inter2],[inter2],[called(inter2,Lowell Street),category(inter2,

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| | - intersection)], [has(inter2,lights1),called(inter2,Lowell Street),category(inter2,
| | - intersection)],3)
| | +-salient_attrib_rel(entity(1,inter2),entity(4,lights1),_271642^_271645^has(_271642,
| | | - _271645),[called(inter2,Lowell Street),category(inter2,intersection)], [has(inter2,lights1
| | | - ),called(inter2,Lowell Street),category(inter2,intersection)])
| | +-s-attrib-rel(entity(1,inter2),entity(4,lights1),_271642^_271645^has(_271642,_271645))
| | +-ref(entity(4,lights1),lights1)
| | +-subset([inter2],_272136^ab(system,user,apply(apply(_271642^_271645^has(_271642,
| | | - _271645),_272136),lights1)), [inter2])
| | +-refer(entity(4,lights1),2)
| | | +-s-refer(entity(4,lights1))
| | | +-describe(entity(4,lights1),2)
| | | | +-context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2])
| | | | +-headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],entity(
| | | | | - 4,lights1),[lights1],[category(lights1,traffic_lights)],2)
| | | | | +-s-attrib(entity(4,lights1),_271617^category(_271617,traffic_lights))
| | | | | +-subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| | | | | | - _271617^ab(system,user,category(_271617,traffic_lights)), [lights1])
| | | | | +-ref(entity(4,lights1),lights1)
| | | | | +-[category(lights1,traffic_lights)]=[category(lights1,traffic_lights)]
| | | | | +-confidence_headnoun(2,entity(4,lights1),traffic_lights)
| | | | | +-modifiers(entity(4,lights1),[lights1],[category(lights1,traffic_lights)],2,
| | | | | - 2)
| | | | | +-null
| | | +-confidence_attrib_rel(3,entity(1,inter2),entity(4,lights1),_271642^_271645^has(
| | | | - _271642,_271645))
| | +-confidence_add(6,3,3)
| +-modifiers(entity(1,inter2), [inter2], [has(inter2,lights1),called(inter2,Lowell Street),category
| | - (inter2,intersection)],6,8)
| +-modifier(entity(1,inter2), [inter2], [inter2], [has(inter2,lights1),called(inter2,Lowell Street
| | - ),category(inter2,intersection)], [has(inter2,sign1),has(inter2,lights1),called(inter2,
| | - Lowell Street),category(inter2,intersection)],2)
| | +-salient_attrib_rel(entity(1,inter2),entity(6,sign1),_271668^_271671^has(_271668,
| | | - _271671), [has(inter2,lights1),called(inter2,Lowell Street),category(inter2,intersection
| | | - )], [has(inter2,sign1),has(inter2,lights1),called(inter2,Lowell Street),category(inter2,
| | | - intersection)])
| | +-s-attrib-rel(entity(1,inter2),entity(6,sign1),_271668^_271671^has(_271668,_271671))
| | +-ref(entity(6,sign1),sign1)
| | +-subset([inter2],_272770^ab(system,user,apply(apply(_271668^_271671^has(_271668,
| | | - _271671),_272770),sign1)), [inter2])
| | +-refer(entity(6,sign1),1)
| | | +-s-refer(entity(6,sign1))
| | | +-describe(entity(6,sign1),1)
| | | | +-context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2])
| | | | +-headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],entity(
| | | | | - 6,sign1),[sign1],[category(sign1,sign)],1)
| | | | | +-s-attrib(entity(6,sign1),_271692^category(_271692,sign))
| | | | | +-subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| | | | | | - _271692^ab(system,user,category(_271692,sign)), [sign1])
| | | | | +-ref(entity(6,sign1),sign1)
| | | | | +-[category(sign1,sign)]=[category(sign1,sign)]
| | | | | +-confidence_headnoun(1,entity(6,sign1),sign)
| | | | | +-modifiers(entity(6,sign1),[sign1],[category(sign1,sign)],1,1)
| | | | | +-null
| | | +-confidence_attrib_rel(2,entity(1,inter2),entity(6,sign1),_271668^_271671^has(
| | | | - _271668,_271671))
| | +-confidence_add(8,6,2)
| +-modifiers(entity(1,inter2), [inter2], [has(inter2,sign1),has(inter2,lights1),called(inter2,
| | - Lowell Street),category(inter2,intersection)],8,8)

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+-null
V2=_274664:describe-route(route([goto(exit1,inter2,street1,+(1),_331832)]))
+-_274764:directions(here(exit1,street1,+(1)),[goto(exit1,inter2,street1,+(1),_332153)],here(
  - inter2,street1,+(1)))
+-_274832:direction(here(exit1,street1,+(1)),goto(exit1,inter2,street1,+(1),_274686),here(
  | - inter2,street1,+(1)))
| +-_274914:ref(entity(1,inter2),inter2)
| +-_274925:s-goto(entity(1,inter2))
| +-_275037:set_context(exit1,inter2,street1,+(1))
| +-_275049:refer(entity(1,inter2),8)
| | +-_275083:s-refer(entity(1,inter2))
| | +-_275102:describe(entity(1,inter2),8)
| |   +-_275122:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,
| |     | - street2])
| |   +-_275147:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| |     | - entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],1)
| |   +-_275211:s-attrib(entity(1,inter2),_275229^category(_275229,intersection))
| |   +-_275288:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| |     | | - _275229^ab(system,user,category(_275229,intersection)),[inter1,inter2])
| |   +-_275329:ref(entity(1,inter2),inter2)
| |   +-_275340:[category(inter2,intersection)]=[category(inter2,intersection)]
| |   +-_275358:confidence_headnoun(1,entity(1,inter2),intersection)
+-_275370:modifiers(entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],
  - 1,8)
+-_275402:modifier(entity(1,inter2),[inter1,inter2],[inter2],[category(inter2,
  | - intersection)],[called(inter2,Lowell Street),category(inter2,intersection)],
  | - 2)
| +-_275461:salient_attrib(entity(1,inter2),_275472^called(_275472,Lowell Street),[
| |   - category(inter2,intersection)],[called(inter2,Lowell Street),category(inter2,
| |     - intersection)])
| +-_275495:s-attrib(entity(1,inter2),_275472^called(_275472,Lowell Street))
| +-_275572:subset([inter1,inter2],_275583^ab(system,user,apply(_275472^called(
| |   - _275472,Lowell Street),_275583)),[inter2])
| +-_275603:confidence_attrib(2,entity(1,inter2),_275472^called(_275472,Lowell Street)
|   - )
+-_275621:confidence_add(3,1,2)
+-_275630:modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(
  - inter2,intersection)],3,8)
+-_275665:modifier(entity(1,inter2),[inter2],[inter2],[called(inter2,Lowell Street),
  | - category(inter2,intersection)],[has(inter2,lights1),called(inter2,Lowell Street
  | - ),category(inter2,intersection)],3)
| +-_275732:salient_attrib_rel(entity(1,inter2),entity(4,lights1),_271642^
| |   - _271645^has(_271642,_271645),[called(inter2,Lowell Street),category(inter2,
| |     - intersection)],[has(inter2,lights1),called(inter2,Lowell Street),category(
| |       - inter2,intersection)])
| +-_275783:s-attrib_rel(entity(1,inter2),entity(4,lights1),_271642^_271645^has(
| |   - _271642,_271645))
| +-_275878:ref(entity(4,lights1),lights1)
| +-_275889:subset([inter2],_272136^ab(system,user,apply(apply(_271642^
| |   - _271645^has(_271642,_271645),_272136),lights1)),[inter2])
| +-_275924:refer(entity(4,lights1),2)
| | +-_275958:s-refer(entity(4,lights1))
| | +-_275977:describe(entity(4,lights1),2)
| |   +-_275997:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| |     | - street1,street2])
| |   +-_276022:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1
| |     | - ,street2],entity(4,lights1),[lights1],[category(lights1,traffic_lights)],
| |     | - 2)
| |   +-_276084:s-attrib(entity(4,lights1),_271617^category(_271617,traffic_lights

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| | | | - ))
| | | | +-_276161:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1
| | | | | - ,street2],_271617^ab(system,user,category(_271617,traffic_lights)),[
| | | | | - lights1])
| | | | +-_276200:ref(entity(4,lights1),lights1)
| | | | +-_276211:[category(lights1,traffic_lights)]=[category(lights1,
| | | | | - traffic_lights)]
| | | | +-_276229:confidence_headnoun(2,entity(4,lights1),traffic_lights)
| | +-_276241:modifiers(entity(4,lights1),[lights1],[category(lights1,
| | | - traffic_lights)],2,2)
| | +-_276305:null
| +-_276328:confidence_attrib_rel(3,entity(1,inter2),entity(4,lights1),
| | - _271642^_271645^has(_271642,_271645))
+-_276353:confidence_add(6,3,3)
+-_276362:modifiers(entity(1,inter2),[inter2],[has(inter2,lights1),called(inter2,
| - Lowell Street),category(inter2,intersection)],6,8)
+-_276402:modifier(entity(1,inter2),[inter2],[inter2],[has(inter2,lights1),called(
| - inter2,Lowell Street),category(inter2,intersection)],[has(inter2,sign1),has(
| - inter2,lights1),called(inter2,Lowell Street),category(inter2,intersection)],
| - 2)
+-_276479:salient_attrib_rel(entity(1,inter2),entity(6,sign1),_271668^
| | - _271671^has(_271668,_271671),[has(inter2,lights1),called(inter2,
| | - Lowell Street),category(inter2,intersection)],[has(inter2,sign1),has(inter2
| | - ,lights1),called(inter2,Lowell Street),category(inter2,intersection)])
+-_276540:s-attrib_rel(entity(1,inter2),entity(6,sign1),_271668^_271671^has(
| | - _271668,_271671))
+-_276635:ref(entity(6,sign1),sign1)
+-_276646:subset([inter2],_272770^ab(system,user,apply(apply(_271668^
| | - _271671^has(_271668,_271671),_272770),sign1)),[inter2])
+-_276681:refer(entity(6,sign1),1)
| +-_276715:s-refer(entity(6,sign1))
| +-_276734:describe(entity(6,sign1),1)
| | +-_276754:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,
| | | - sign1,street1,street2])
| | +-_276779:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| | | - street1,street2],entity(6,sign1),[sign1],[category(sign1,sign)],
| | | - 1)
| | +-_276841:s-attrib(entity(6,sign1),_271692^category(_271692,sign))
| | +-_276918:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| | | - street1,street2],_271692^ab(system,user,category(_271692,sign)),[
| | | - sign1])
| | +-_276957:ref(entity(6,sign1),sign1)
| | +-_276968:[category(sign1,sign)]=[category(sign1,sign)]
| | +-_276986:confidence_headnoun(1,entity(6,sign1),sign)
| +-_276998:modifiers(entity(6,sign1),[sign1],[category(sign1,sign)],
| | - 1,1)
| | +-_277062:null
| +-_277085:confidence_attrib_rel(2,entity(1,inter2),entity(6,sign1),
| | - _271668^_271671^has(_271668,_271671))
+-_277110:confidence_add(8,6,2)
+-_277119:modifiers(entity(1,inter2),[inter2],[has(inter2,sign1),has(inter2,
| - lights1),called(inter2,Lowell Street),category(inter2,intersection)],
| - 8,8)
| +-_277198:null
| +-_277221:here(inter2,street1,+(1))=here(inter2,street1,+(1))
+-_277241:directions(here(inter2,street1,+(1)),[],here(inter2,street1,+(1)))
+-_277299:null
V3=s-attrib(entity(6,sign1),_271692^category(_271692,sign))
s-refer(entity(6,sign1))

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| s-attrib-rel(entity(1,inter2),entity(6,sign1),_271668^_271671^has(_271668,_271671))
| s-attrib(entity(4,lights1),_271617^category(_271617,traffic_lights))
| s-refer(entity(4,lights1))
| s-attrib-rel(entity(1,inter2),entity(4,lights1),_271642^_271645^has(_271642,_271645))
+-evaluate(V1)
| V1=_274664:describe-route(route([goto(exit1,inter2,street1,+(1),_369291)]))
| +-_274764:directions(here(exit1,street1,+(1)),[goto(exit1,inter2,street1,+(1),_369612)],here(
| - inter2,street1,+(1)))
| +-_274832:direction(here(exit1,street1,+(1)),goto(exit1,inter2,street1,+(1),_274686),here(
| - inter2,street1,+(1)))
| +-_274914:ref(entity(1,inter2),inter2)
| +-_274925:s-goto(entity(1,inter2))
| +-_275037:set_context(exit1,inter2,street1,+(1))
| +-_275049:refer(entity(1,inter2),8)
| | +-_275083:s-refer(entity(1,inter2))
| | +-_275102:describe(entity(1,inter2),8)
| | +-_275122:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,
| | - street2])
| | +-_275147:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| | - entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],1)
| | +-_275211:s-attrib(entity(1,inter2),_275229^category(_275229,intersection))
| | +-_275288:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| | - _275229^ab(system,user,category(_275229,intersection)),[inter1,inter2])
| | +-_275329:ref(entity(1,inter2),inter2)
| | +-_275340:[category(inter2,intersection)]=[category(inter2,intersection)]
| | +-_275358:confidence_headnoun(1,entity(1,inter2),intersection)
| +-_275370:modifiers(entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],
| - 1,8)
| +-_275402:modifier(entity(1,inter2),[inter1,inter2],[inter2],[category(inter2,
| - intersection)],[called(inter2,Lowell Street),category(inter2,intersection)],
| - 2)
| | +-_275461:salient_attrib(entity(1,inter2),_275472^called(_275472,Lowell Street),[
| | - category(inter2,intersection)],[called(inter2,Lowell Street),category(inter2,
| | - intersection)])
| | +-_275495:s-attrib(entity(1,inter2),_275472^called(_275472,Lowell Street))
| | +-_275572:subset([inter1,inter2],_275583^ab(system,user,apply(_275472^called(
| | - _275472,Lowell Street),_275583)),[inter2])
| | +-_275603:confidence_attrib(2,entity(1,inter2),_275472^called(_275472,Lowell Street)
| | - )
| +-_275621:confidence_add(3,1,2)
| +-_275630:modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(
| - inter2,intersection)],3,8)
| | +-_275665:modifier(entity(1,inter2),[inter2],[inter2],[called(inter2,Lowell Street),
| | - category(inter2,intersection)],[has(inter2,lights1),called(inter2,Lowell Street
| | - ),category(inter2,intersection)],3)
| | +-_275732:salient_attrib_rel(entity(1,inter2),entity(4,lights1),_271642^
| | - _271645^has(_271642,_271645),[called(inter2,Lowell Street),category(inter2,
| | - intersection)],[has(inter2,lights1),called(inter2,Lowell Street),category(
| | - inter2,intersection)])
| | +-_275783:s-attrib-rel(entity(1,inter2),entity(4,lights1),_271642^_271645^has(
| | - _271642,_271645))
| | +-_275878:ref(entity(4,lights1),lights1)
| | +-_275889:subset([inter2],_272136^ab(system,user,apply(apply(_271642^
| | - _271645^has(_271642,_271645),_272136),lights1)),[inter2])
| | +-_275924:refer(entity(4,lights1),2)
| | | +-_275958:s-refer(entity(4,lights1))
| | | +-_275977:describe(entity(4,lights1),2)
| | | | +-_275997:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| | | - street1,street2])

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| | | | +-_276022:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1
| | | | | - ,street2],entity(4,lights1),[lights1],[category(lights1,traffic_lights)],
| | | | | - 2)
| | | | +-_276084:s-attrib(entity(4,lights1),_271617^category(_271617,traffic_lights
| | | | | - ))
| | | | +-_276161:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1
| | | | | | - ,street2],_271617^ab(system,user,category(_271617,traffic_lights)),[
| | | | | | - lights1])
| | | | +-_276200:ref(entity(4,lights1),lights1)
| | | | +-_276211:[category(lights1,traffic_lights)]=[category(lights1,
| | | | | - traffic_lights)]
| | | | +-_276229:confidence_headnoun(2,entity(4,lights1),traffic_lights)
| | | +-_276241:modifiers(entity(4,lights1),[lights1],[category(lights1,
| | | | - traffic_lights)],2,2)
| | | +-_276305:null
| +-_276328:confidence_attrib_rel(3,entity(1,inter2),entity(4,lights1),
| | - _271642^_271645^has(_271642,_271645))
+-_276353:confidence_add(6,3,3)
+-_276362:modifiers(entity(1,inter2),[inter2],[has(inter2,lights1),called(inter2,
| - Lowell Street),category(inter2,intersection)],6,8)
+-_276402:modifier(entity(1,inter2),[inter2],[inter2],[has(inter2,lights1),called(
| - inter2,Lowell Street),category(inter2,intersection)],[has(inter2,sign1),has(
| - inter2,lights1),called(inter2,Lowell Street),category(inter2,intersection)],
| - 2)
+-_276479:salient_attrib_rel(entity(1,inter2),entity(6,sign1),_271668^
| | - _271671^has(_271668,_271671),[has(inter2,lights1),called(inter2,
| | - Lowell Street),category(inter2,intersection)],[has(inter2,sign1),has(inter2
| | - ,lights1),called(inter2,Lowell Street),category(inter2,intersection)])
+-_276540:s-attrib_rel(entity(1,inter2),entity(6,sign1),_271668^_271671^has(
| | - _271668,_271671))
+-_276635:ref(entity(6,sign1),sign1)
+-_276646:subset([inter2],_272770^ab(system,user,apply(apply(_271668^
| | - _271671^has(_271668,_271671),_272770),sign1)),[inter2])
+-_276681:refer(entity(6,sign1),1)
| +-_276715:s-refer(entity(6,sign1))
| +-_276734:describe(entity(6,sign1),1)
| | +-_276754:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,
| | | - sign1,street1,street2])
| | +-_276779:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| | | - street1,street2],entity(6,sign1),[sign1],[category(sign1,sign)],
| | | - 1)
| | +-_276841:s-attrib(entity(6,sign1),_271692^category(_271692,sign))
| | +-_276918:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| | | - street1,street2],_271692^ab(system,user,category(_271692,sign)),[
| | | - sign1])
| | +-_276957:ref(entity(6,sign1),sign1)
| | +-_276968:[category(sign1,sign)]=[category(sign1,sign)]
| | +-_276986:confidence_headnoun(1,entity(6,sign1),sign)
| +-_276998:modifiers(entity(6,sign1),[sign1],[category(sign1,sign)],
| | - 1,1)
| | +-_277062:null
| +-_277085:confidence_attrib_rel(2,entity(1,inter2),entity(6,sign1),
| | - _271668^_271671^has(_271668,_271671))
+-_277110:confidence_add(8,6,2)
+-_277119:modifiers(entity(1,inter2),[inter2],[has(inter2,sign1),has(inter2,
| - lights1),called(inter2,Lowell Street),category(inter2,intersection)],
| - 8,8)
| +-_277198:null
+-_277221:here(inter2,street1,+(1))=here(inter2,street1,+(1))

```

```

|     +-_277241:directions(here(inter2,street1,+(1)),[],here(inter2,street1,+(1)))
|     +-_277299:null
+-respond-to-suggestion(p1,[s-attrib-rel(entity(1,inter2),entity(6,sign1),_389450^_389453^has(
- _389450,_389453)),s-refer(entity(6,sign1)),s-attrib(entity(6,sign1),_389474^category(
- _389474,sign1))],[s-attrib(entity(6,sign1),_389882^category(_389882,sign1)),s-refer(entity(
- 6,sign1)),s-attrib-rel(entity(1,inter2),entity(6,sign1),_389907^_389910^has(_389907,
- _389910)),s-attrib(entity(4,lights1),_389924^category(_389924,traffic_lights)),s-refer(entity(
- 4,lights1)),s-attrib-rel(entity(1,inter2),entity(4,lights1),_389949^_389952^has(_389949,
- _389952))])
+-partition([s-attrib(entity(6,sign1),_390815^category(_390815,sign1)),s-refer(entity(6,sign1)),
| - s-attrib-rel(entity(1,inter2),entity(6,sign1),_390840^_390843^has(_390840,_390843)),s-attrib(
| - entity(4,lights1),_390857^category(_390857,traffic_lights)),s-refer(entity(4,lights1)),
| - s-attrib-rel(entity(1,inter2),entity(4,lights1),_390882^_390885^has(_390882,_390885))],[
| - s-attrib-rel(entity(1,inter2),entity(6,sign1),_391704^_391707^has(_391704,_391707)),s-refer(
| - entity(6,sign1)),s-attrib(entity(6,sign1),_391728^category(_391728,sign1))],[s-attrib(entity(
| - 4,lights1),_392148^category(_392148,traffic_lights)),s-refer(entity(4,lights1)),s-attrib-rel(
| - entity(1,inter2),entity(4,lights1),_392173^_392176^has(_392173,_392176))])
+-s-affirm(p1,V1)
| V1=s-attrib-rel(entity(1,inter2),entity(6,sign1),_271668^_271671^has(_271668,_271671))
|   s-refer(entity(6,sign1))
|   s-attrib(entity(6,sign1),_271692^category(_271692,sign1))
+-s-actions(p1,V1)
  V1=s-attrib(entity(4,lights1),_271617^category(_271617,traffic_lights))
  s-refer(entity(4,lights1))
  s-attrib-rel(entity(1,inter2),entity(4,lights1),_271642^_271645^has(_271642,_271645))

```

Actions to be fed to generator

```

s-actions(p1,V1)
V1=s-attrib(entity(4,lights1),_271617^category(_271617,traffic_lights))
  s-refer(entity(4,lights1))
  s-attrib-rel(entity(1,inter2),entity(4,lights1),_271642^_271645^has(_271642,_271645))
s-affirm(p1,V1)
V1=s-attrib-rel(entity(1,inter2),entity(6,sign1),_271668^_271671^has(_271668,_271671))
  s-refer(entity(6,sign1))
  s-attrib(entity(6,sign1),_271692^category(_271692,sign1))

```

User Model: Adding Proposition

```

plan(system,p103,mb(system,user,replace(p1,V1)))
V1=_274664:describe-route(route([goto(exit1,inter2,street1,+(1),_422187)]))
+-_274764:directions(here(exit1,street1,+(1)),[goto(exit1,inter2,street1,+(1),_422492)],here(
- inter2,street1,+(1)))
+-_274832:direction(here(exit1,street1,+(1)),goto(exit1,inter2,street1,+(1),_274686),here(inter2
| - ,street1,+(1)))
| +-_274914:ref(entity(1,inter2),inter2)
| +-_274925:s-goto(entity(1,inter2))
| +-_275037:set_context(exit1,inter2,street1,+(1))
| +-_275049:refer(entity(1,inter2),8)
| | +-_275083:s-refer(entity(1,inter2))
| | +-_275102:describe(entity(1,inter2),8)
| | +-_275122:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,
| | | - street2])
| | +-_275147:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| | | - entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],1)
| | | +-_275211:s-attrib(entity(1,inter2),_275229^category(_275229,intersection))
| | | +-_275288:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| | | | - _275229^ab(system,user,category(_275229,intersection)),[inter1,inter2])
| | | +-_275329:ref(entity(1,inter2),inter2)
| | | +-_275340:[category(inter2,intersection)]=[category(inter2,intersection)]

```

```

| | | +-_275358:confidence_headnoun(1,entity(1,inter2),intersection)
| | +-_275370:modifiers(entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],
| | - 1,8)
| | +-_275402:modifier(entity(1,inter2),[inter1,inter2],[inter2],[category(inter2,
| | - intersection)],[called(inter2,Lowell Street),category(inter2,intersection)],
| | - 2)
| | +-_275461:salient_attrib(entity(1,inter2),_275472^called(_275472,Lowell Street),[
| | - category(inter2,intersection)],[called(inter2,Lowell Street),category(inter2,
| | - intersection)])
| | +-_275495:s-attrib(entity(1,inter2),_275472^called(_275472,Lowell Street))
| | +-_275572:subset([inter1,inter2],_275583^ab(system,user,apply(_275472^called(
| | - _275472,Lowell Street),_275583)),[inter2])
| | +-_275603:confidence_attrib(2,entity(1,inter2),_275472^called(_275472,Lowell Street))
| | +-_275621:confidence_add(3,1,2)
| | +-_275630:modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(
| | - inter2,intersection)],3,8)
| | +-_275665:modifier(entity(1,inter2),[inter2],[inter2],[called(inter2,Lowell Street),
| | - category(inter2,intersection)],[has(inter2,lights1),called(inter2,Lowell Street),
| | - category(inter2,intersection)],3)
| | +-_275732:salient_attrib_rel(entity(1,inter2),entity(4,lights1),_271642^
| | - _271645^has(_271642,_271645),[called(inter2,Lowell Street),category(inter2,
| | - intersection)],[has(inter2,lights1),called(inter2,Lowell Street),category(
| | - inter2,intersection)])
| | +-_275783:s-attrib-rel(entity(1,inter2),entity(4,lights1),_271642^_271645^has(
| | - _271642,_271645))
| | +-_275878:ref(entity(4,lights1),lights1)
| | +-_275889:subset([inter2],_272136^ab(system,user,apply(apply(_271642^_271645^has(
| | - _271642,_271645),_272136),lights1)),[inter2])
| | +-_275924:refer(entity(4,lights1),2)
| | +-_275958:s-refer(entity(4,lights1))
| | +-_275977:describe(entity(4,lights1),2)
| | +-_275997:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| | - street1,street2])
| | +-_276022:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,
| | - street2],entity(4,lights1),[lights1],[category(lights1,traffic_lights)],
| | - 2)
| | +-_276084:s-attrib(entity(4,lights1),_271617^category(_271617,traffic_lights))
| | +-_276161:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,
| | - street2],_271617^ab(system,user,category(_271617,traffic_lights)),[
| | - lights1])
| | +-_276200:ref(entity(4,lights1),lights1)
| | +-_276211:[category(lights1,traffic_lights)]=[category(lights1,traffic_lights)
| | - ]
| | +-_276229:confidence_headnoun(2,entity(4,lights1),traffic_lights)
| | +-_276241:modifiers(entity(4,lights1),[lights1],[category(lights1,traffic_lights
| | - )],2,2)
| | +-_276305:null
| | +-_276328:confidence_attrib_rel(3,entity(1,inter2),entity(4,lights1),_271642^
| | - _271645^has(_271642,_271645))
| | +-_276353:confidence_add(6,3,3)
| | +-_276362:modifiers(entity(1,inter2),[inter2],[has(inter2,lights1),called(inter2,
| | - Lowell Street),category(inter2,intersection)],6,8)
| | +-_276402:modifier(entity(1,inter2),[inter2],[inter2],[has(inter2,lights1),called(
| | - inter2,Lowell Street),category(inter2,intersection)],[has(inter2,sign1),has(
| | - inter2,lights1),called(inter2,Lowell Street),category(inter2,intersection)],
| | - 2)
| | +-_276479:salient_attrib_rel(entity(1,inter2),entity(6,sign1),_271668^
| | - _271671^has(_271668,_271671),[has(inter2,lights1),called(inter2,Lowell Street
| | - ),category(inter2,intersection)],[has(inter2,sign1),has(inter2,lights1),

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| | | | - called(inter2,Lowell Street),category(inter2,intersection)])
| | | | +-_276540:s-attrib-rel(entity(1,inter2),entity(6,sign1),_271668^_271671^has(
| | | | | - _271668,_271671))
| | | | +-_276635:ref(entity(6,sign1),sign1)
| | | | +-_276646:subset([inter2],_272770^ab(system,user,apply(apply(_271668^
| | | | | - _271671^has(_271668,_271671),_272770),sign1)),[inter2])
| | | | +-_276681:refer(entity(6,sign1),1)
| | | | +-_276715:s-refer(entity(6,sign1))
| | | | +-_276734:describe(entity(6,sign1),1)
| | | | | +-_276754:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| | | | | | - street1,street2])
| | | | | +-_276779:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1
| | | | | | - ,street2],entity(6,sign1),[sign1],[category(sign1,sign)],1)
| | | | | +-_276841:s-attrib(entity(6,sign1),_271692^category(_271692,sign))
| | | | | +-_276918:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1
| | | | | | - ,street2],_271692^ab(system,user,category(_271692,sign)),[sign1])
| | | | | +-_276957:ref(entity(6,sign1),sign1)
| | | | | +-_276968:[category(sign1,sign)]=[category(sign1,sign)]
| | | | | +-_276986:confidence_headnoun(1,entity(6,sign1),sign)
| | | | | +-_276998:modifiers(entity(6,sign1),[sign1],[category(sign1,sign)],
| | | | | | - 1,1)
| | | | | +-_277062:null
| | | | +-_277085:confidence_attrib_rel(2,entity(1,inter2),entity(6,sign1),_271668^
| | | | | - _271671^has(_271668,_271671))
| | | +-_277110:confidence_add(8,6,2)
| | | +-_277119:modifiers(entity(1,inter2),[inter2],[has(inter2,sign1),has(inter2,lights1)
| | | | - ,called(inter2,Lowell Street),category(inter2,intersection)],8,8)
| | | +-_277198:null
| | +-_277221:here(inter2,street1,+(1))=here(inter2,street1,+(1))
+-_277241:directions(here(inter2,street1,+(1)),[],here(inter2,street1,+(1)))
+-_277299:null

```

Pushing to focus stack: focus(p103,p103,mb(system,user,replace(p1,V1)))

```

V1=_274664:describe-route(route([goto(exit1,inter2,street1,+(1),_484723)]))
+-_274764:directions(here(exit1,street1,+(1)),[goto(exit1,inter2,street1,+(1),_485028)],here(
- inter2,street1,+(1)))
+-_274832:direction(here(exit1,street1,+(1)),goto(exit1,inter2,street1,+(1),_274686),here(inter2
| - ,street1,+(1)))
| +-_274914:ref(entity(1,inter2),inter2)
| +-_274925:s-goto(entity(1,inter2))
| +-_275037:set_context(exit1,inter2,street1,+(1))
| +-_275049:refer(entity(1,inter2),8)
| | +-_275083:s-refer(entity(1,inter2))
| | +-_275102:describe(entity(1,inter2),8)
| | | +-_275122:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,
| | | | - street2])
| | | +-_275147:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| | | | - entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],1)
| | | | +-_275211:s-attrib(entity(1,inter2),_275229^category(_275229,intersection))
| | | | +-_275288:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| | | | | - _275229^ab(system,user,category(_275229,intersection)),[inter1,inter2])
| | | | +-_275329:ref(entity(1,inter2),inter2)
| | | | +-_275340:[category(inter2,intersection)]=[category(inter2,intersection)]
| | | | +-_275358:confidence_headnoun(1,entity(1,inter2),intersection)
| | +-_275370:modifiers(entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],
| | | - 1,8)
| | | +-_275402:modifier(entity(1,inter2),[inter1,inter2],[inter2],[category(inter2,
| | | | - intersection)],[called(inter2,Lowell Street),category(inter2,intersection)],
| | | | - 2)

```

```

| | +- _275461:salient_attrib(entity(1,inter2),_275472^called(_275472,Lowell Street),[
| | | - category(inter2,intersection)],[called(inter2,Lowell Street),category(inter2,
| | | - intersection)])
| | +- _275495:s-attrib(entity(1,inter2),_275472^called(_275472,Lowell Street))
| | +- _275572:subset([inter1,inter2],_275583^ab(system,user,apply(_275472^called(
| | | - _275472,Lowell Street),_275583)),[inter2])
| | +- _275603:confidence_attrib(2,entity(1,inter2),_275472^called(_275472,Lowell Street))
+- _275621:confidence_add(3,1,2)
+- _275630:modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(
| | - inter2,intersection)],3,8)
+- _275665:modifier(entity(1,inter2),[inter2],[inter2],[called(inter2,Lowell Street),
| | - category(inter2,intersection)],[has(inter2,lights1),called(inter2,Lowell Street),
| | - category(inter2,intersection)],3)
| +- _275732:salient_attrib_rel(entity(1,inter2),entity(4,lights1),_271642^
| | - _271645^has(_271642,_271645),[called(inter2,Lowell Street),category(inter2,
| | - intersection)],[has(inter2,lights1),called(inter2,Lowell Street),category(
| | - inter2,intersection)])
| +- _275783:s-attrib_rel(entity(1,inter2),entity(4,lights1),_271642^_271645^has(
| | - _271642,_271645))
| +- _275878:ref(entity(4,lights1),lights1)
| +- _275889:subset([inter2],_272136^ab(system,user,apply(apply(_271642^_271645^has(
| | - _271642,_271645),_272136),lights1)),[inter2])
| +- _275924:refer(entity(4,lights1),2)
| | +- _275958:s-refer(entity(4,lights1))
| | +- _275977:describe(entity(4,lights1),2)
| | | +- _275997:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| | | | - street1,street2])
| | | +- _276022:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,
| | | | - street2],entity(4,lights1),[lights1],[category(lights1,traffic_lights)],
| | | | - 2)
| | | | +- _276084:s-attrib(entity(4,lights1),_271617^category(_271617,traffic_lights))
| | | | +- _276161:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,
| | | | | - street2],_271617^ab(system,user,category(_271617,traffic_lights)),[
| | | | | - lights1])
| | | | +- _276200:ref(entity(4,lights1),lights1)
| | | | +- _276211:[category(lights1,traffic_lights)]=[category(lights1,traffic_lights)
| | | | | - ]
| | | | +- _276229:confidence_headnoun(2,entity(4,lights1),traffic_lights)
| | | +- _276241:modifiers(entity(4,lights1),[lights1],[category(lights1,traffic_lights
| | | - )],2,2)
| | | +- _276305:null
| +- _276328:confidence_attrib_rel(3,entity(1,inter2),entity(4,lights1),_271642^
| | - _271645^has(_271642,_271645))
+- _276353:confidence_add(6,3,3)
+- _276362:modifiers(entity(1,inter2),[inter2],[has(inter2,lights1),called(inter2,
| | - Lowell Street),category(inter2,intersection)],6,8)
+- _276402:modifier(entity(1,inter2),[inter2],[inter2],[has(inter2,lights1),called(
| | - inter2,Lowell Street),category(inter2,intersection)],[has(inter2,sign1),has(
| | - inter2,lights1),called(inter2,Lowell Street),category(inter2,intersection)],
| | - 2)
| +- _276479:salient_attrib_rel(entity(1,inter2),entity(6,sign1),_271668^
| | - _271671^has(_271668,_271671),[has(inter2,lights1),called(inter2,Lowell Street
| | - ),category(inter2,intersection)],[has(inter2,sign1),has(inter2,lights1),
| | - called(inter2,Lowell Street),category(inter2,intersection)])
| +- _276540:s-attrib_rel(entity(1,inter2),entity(6,sign1),_271668^_271671^has(
| | - _271668,_271671))
| +- _276635:ref(entity(6,sign1),sign1)
| +- _276646:subset([inter2],_272770^ab(system,user,apply(apply(_271668^
| | - _271671^has(_271668,_271671),_272770),sign1)),[inter2])

```

```

| | | +-_276681:refer(entity(6,sign1),1)
| | | | +-_276715:s-refer(entity(6,sign1))
| | | | +-_276734:describe(entity(6,sign1),1)
| | | | | +-_276754:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| | | | | - street1,street2])
| | | | +-_276779:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1
| | | | | - ,street2],entity(6,sign1),[sign1],[category(sign1,sign)],1)
| | | | | +-_276841:s-attrib(entity(6,sign1),_271692^category(_271692,sign))
| | | | | +-_276918:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1
| | | | | | - ,street2],_271692^ab(system,user,category(_271692,sign)),[sign1])
| | | | | +-_276957:ref(entity(6,sign1),sign1)
| | | | | +-_276968:[category(sign1,sign)]=[category(sign1,sign)]
| | | | | +-_276986:confidence_headnoun(1,entity(6,sign1),sign)
| | | | +-_276998:modifiers(entity(6,sign1),[sign1],[category(sign1,sign)],
| | | | - 1,1)
| | | | +-_277062:null
| | | +-_277085:confidence_attrib_rel(2,entity(1,inter2),entity(6,sign1),_271668^
| | | - _271671^has(_271668,_271671))
| | +-_277110:confidence_add(8,6,2)
| | +-_277119:modifiers(entity(1,inter2),[inter2],[has(inter2,sign1),has(inter2,lights1)
| | - ,called(inter2,Lowell Street),category(inter2,intersection)],8,8)
| | +-_277198:null
| +-_277221:here(inter2,street1,+(1))=here(inter2,street1,+(1))
+-_277241:directions(here(inter2,street1,+(1)),[],here(inter2,street1,+(1)))
+-_277299:null

```

User Model: Adding Proposition

achieve(p103,p103,mb(system,user,replace(p1,V1)))

V1=_274664:describe-route(route([goto(exit1,inter2,street1,+(1),_504579)]))

```

+-_274764:directions(here(exit1,street1,+(1)),[goto(exit1,inter2,street1,+(1),_504884)],here(
- inter2,street1,+(1)))

```

```

+-_274832:direction(here(exit1,street1,+(1)),goto(exit1,inter2,street1,+(1),_274686),here(inter2
- ,street1,+(1)))

```

```

| +-_274914:ref(entity(1,inter2),inter2)

```

```

| +-_274925:s-goto(entity(1,inter2))

```

```

| +-_275037:set_context(exit1,inter2,street1,+(1))

```

```

| +-_275049:refer(entity(1,inter2),8)

```

```

| | +-_275083:s-refer(entity(1,inter2))

```

```

| | +-_275102:describe(entity(1,inter2),8)

```

```

| | | +-_275122:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,
| | | - street2])

```

```

| | +-_275147:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| | - entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],1)

```

```

| | | +-_275211:s-attrib(entity(1,inter2),_275229^category(_275229,intersection))

```

```

| | | +-_275288:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| | | | - _275229^ab(system,user,category(_275229,intersection)),[inter1,inter2])

```

```

| | | +-_275329:ref(entity(1,inter2),inter2)

```

```

| | | +-_275340:[category(inter2,intersection)]=[category(inter2,intersection)]

```

```

| | | +-_275358:confidence_headnoun(1,entity(1,inter2),intersection)

```

```

| | +-_275370:modifiers(entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],
| | - 1,8)

```

```

| | +-_275402:modifier(entity(1,inter2),[inter1,inter2],[inter2],[category(inter2,
| | - intersection)],called(inter2,Lowell Street),category(inter2,intersection)],
| | - 2)

```

```

| | | +-_275461:salient_attrib(entity(1,inter2),_275472^called(_275472,Lowell Street),[
| | | | - category(inter2,intersection)],called(inter2,Lowell Street),category(inter2,
| | | | - intersection)])

```

```

| | | +-_275495:s-attrib(entity(1,inter2),_275472^called(_275472,Lowell Street))

```

```

| | | +-_275572:subset([inter1,inter2],_275583^ab(system,user,apply(_275472^called(
| | | | - _275472,Lowell Street),_275583)),[inter2])

```

```

| +-_275603:confidence_attrib(2,entity(1,inter2),_275472^called(_275472,Lowell Street))
| +-_275621:confidence_add(3,1,2)
| +-_275630:modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(
|   - inter2,intersection)],3,8)
| +-_275665:modifier(entity(1,inter2),[inter2],[inter2],[called(inter2,Lowell Street),
|   - category(inter2,intersection)],[has(inter2,lights1),called(inter2,Lowell Street),
|   - category(inter2,intersection)],3)
| +-_275732:salient_attrib_rel(entity(1,inter2),entity(4,lights1),_271642^
|   - _271645^has(_271642,_271645),[called(inter2,Lowell Street),category(inter2,
|   - intersection)],[has(inter2,lights1),called(inter2,Lowell Street),category(
|   - inter2,intersection)])
| +-_275783:s-attrib-rel(entity(1,inter2),entity(4,lights1),_271642^_271645^has(
|   - _271642,_271645))
| +-_275878:ref(entity(4,lights1),lights1)
| +-_275889:subset([inter2],_272136^ab(system,user,apply(apply(_271642^_271645^has(
|   - _271642,_271645),_272136),lights1)),[inter2])
| +-_275924:refer(entity(4,lights1),2)
| +-_275958:s-refer(entity(4,lights1))
| +-_275977:describe(entity(4,lights1),2)
|   +-_275997:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
|     - street1,street2])
|   +-_276022:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,
|     - street2],entity(4,lights1),[lights1],[category(lights1,traffic_lights)],
|     - 2)
|   +-_276084:s-attrib(entity(4,lights1),_271617^category(_271617,traffic_lights))
|   +-_276161:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,
|     - street2],_271617^ab(system,user,category(_271617,traffic_lights)),[
|     - lights1])
|   +-_276200:ref(entity(4,lights1),lights1)
|   +-_276211:[category(lights1,traffic_lights)]=[category(lights1,traffic_lights)
|     - ]
|   +-_276229:confidence_headnoun(2,entity(4,lights1),traffic_lights)
|   +-_276241:modifiers(entity(4,lights1),[lights1],[category(lights1,traffic_lights)
|     - ]),2,2)
|   +-_276305:null
| +-_276328:confidence_attrib_rel(3,entity(1,inter2),entity(4,lights1),_271642^
|   - _271645^has(_271642,_271645))
| +-_276353:confidence_add(6,3,3)
| +-_276362:modifiers(entity(1,inter2),[inter2],[has(inter2,lights1),called(inter2,
|   - Lowell Street),category(inter2,intersection)],6,8)
| +-_276402:modifier(entity(1,inter2),[inter2],[inter2],[has(inter2,lights1),called(
|   - inter2,Lowell Street),category(inter2,intersection)],[has(inter2,sign1),has(
|   - inter2,lights1),called(inter2,Lowell Street),category(inter2,intersection)],
|   - 2)
|   +-_276479:salient_attrib_rel(entity(1,inter2),entity(6,sign1),_271668^
|     - _271671^has(_271668,_271671),[has(inter2,lights1),called(inter2,Lowell Street
|     - ),category(inter2,intersection)],[has(inter2,sign1),has(inter2,lights1),
|     - called(inter2,Lowell Street),category(inter2,intersection)])
|   +-_276540:s-attrib-rel(entity(1,inter2),entity(6,sign1),_271668^_271671^has(
|     - _271668,_271671))
|   +-_276635:ref(entity(6,sign1),sign1)
|   +-_276646:subset([inter2],_272770^ab(system,user,apply(apply(_271668^
|     - _271671^has(_271668,_271671),_272770),sign1)),[inter2])
|   +-_276681:refer(entity(6,sign1),1)
|   +-_276715:s-refer(entity(6,sign1))
|   +-_276734:describe(entity(6,sign1),1)
|     +-_276754:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
|       - street1,street2])
|     +-_276779:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1

```

```

| | | | - ,street2],entity(6,sign1),[sign1],[category(sign1,sign)],1)
| | | | +-_276841:s-attrib(entity(6,sign1),_271692^category(_271692,sign))
| | | | +-_276918:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1
| | | | | - ,street2],_271692^ab(system,user,category(_271692,sign)),[sign1])
| | | | +-_276957:ref(entity(6,sign1),sign1)
| | | | +-_276968:[category(sign1,sign)]=[category(sign1,sign)]
| | | | +-_276986:confidence_headnoun(1,entity(6,sign1),sign)
| | | | +-_276998:modifiers(entity(6,sign1),[sign1],[category(sign1,sign)],
| | | | - 1,1)
| | | | +-_277062:null
| | | | +-_277085:confidence_attrib_rel(2,entity(1,inter2),entity(6,sign1),_271668^
| | | | | - _271671^has(_271668,_271671))
| | | +-_277110:confidence_add(8,6,2)
| | | +-_277119:modifiers(entity(1,inter2),[inter2],[has(inter2,sign1),has(inter2,lights1)
| | | | - ,called(inter2,Lowell Street),category(inter2,intersection)],8,8)
| | | +-_277198:null
| | +-_277221:here(inter2,street1,+(1))=here(inter2,street1,+(1))
+-_13793:directions(here(inter2,street1,+(1)),[],here(inter2,street1,+(1)))
+-_13796:null

```

```

=====
Checking Acceptance and Collaborative Rules
=====

```

Applying m_accept_rule1

Popping from focus stack: focus(p103,p103,mb(system,user,replace(p1,V1)))

V1=_250814:describe-route(route([goto(exit1,inter2,street1,+(1),_270550)]))

+-_250914:directions(here(exit1,street1,+(1)),[goto(exit1,inter2,street1,+(1),_270855)],here(
- inter2,street1,+(1)))

+-_250982:direction(here(exit1,street1,+(1)),goto(exit1,inter2,street1,+(1),_250836),here(inter2
- ,street1,+(1)))

| +-_251064:ref(entity(1,inter2),inter2)

| +-_251075:s-goto(entity(1,inter2))

| +-_251187:set_context(exit1,inter2,street1,+(1))

| +-_251199:refer(entity(1,inter2),8)

| | +-_251233:s-refer(entity(1,inter2))

| | +-_251252:describe(entity(1,inter2),8)

| | +-_251272:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,
| - street2])

| +-_251297:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| - entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],1)

| | +-_251361:s-attrib(entity(1,inter2),_251379^category(_251379,intersection))

| | +-_251438:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| | - _251379^ab(system,user,category(_251379,intersection)),[inter1,inter2])

| | +-_251479:ref(entity(1,inter2),inter2)

| | +-_251490:[category(inter2,intersection)]=[category(inter2,intersection)]

| | +-_251508:confidence_headnoun(1,entity(1,inter2),intersection)

| +-_251520:modifiers(entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],
- 1,8)

| +-_251552:modifier(entity(1,inter2),[inter1,inter2],[inter2],[category(inter2,
| - intersection)],called(inter2,Lowell Street),category(inter2,intersection)],
| - 2)

| | +-_251611:salient_attrib(entity(1,inter2),_251622^called(_251622,Lowell Street),[
| | - category(inter2,intersection)],called(inter2,Lowell Street),category(inter2,
| | - intersection))

| | +-_251645:s-attrib(entity(1,inter2),_251622^called(_251622,Lowell Street))

| | +-_251722:subset([inter1,inter2],_251733^ab(system,user,apply(_251622^called(
| | - _251622,Lowell Street),_251733)),[inter2])

| | +-_251753:confidence_attrib(2,entity(1,inter2),_251622^called(_251622,Lowell Street))


```

+-_251771:confidence_add(3,1,2)
+-_251780:modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(
- inter2,intersection)],3,8)
+-_251815:modifier(entity(1,inter2),[inter2],[inter2],[called(inter2,Lowell Street),
| - category(inter2,intersection)],[has(inter2,lights1),called(inter2,Lowell Street),
| - category(inter2,intersection)],3)
| +-_251882:salient_attrib_rel(entity(1,inter2),entity(4,lights1),_251897^
| | - _251900^has(_251897,_251900),[called(inter2,Lowell Street),category(inter2,
| | - intersection)],[has(inter2,lights1),called(inter2,Lowell Street),category(
| | - inter2,intersection)])
| +-_251933:s-attrib-rel(entity(1,inter2),entity(4,lights1),_251897^_251900^has(
| | - _251897,_251900))
| +-_252028:ref(entity(4,lights1),lights1)
| +-_252039:subset([inter2],_252048^ab(system,user,apply(apply(_251897^_251900^has(
| | - _251897,_251900),_252048),lights1)),[inter2])
| +-_252074:refer(entity(4,lights1),2)
| | +-_252108:s-refer(entity(4,lights1))
| | +-_252127:describe(entity(4,lights1),2)
| |   +-_252147:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| |   | - street1,street2])
| |   +-_252172:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,
| |   | - street2],entity(4,lights1),[lights1],[category(lights1,traffic_lights)],
| |   | - 2)
| |   +-_252234:s-attrib(entity(4,lights1),_252252^category(_252252,traffic_lights))
| |   +-_252311:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,
| |   | - street2],_252252^ab(system,user,category(_252252,traffic_lights)),[
| |   | - lights1])
| |   +-_252350:ref(entity(4,lights1),lights1)
| |   +-_252361:[category(lights1,traffic_lights)]=[category(lights1,traffic_lights)
| |   | - ]
| |   +-_252379:confidence_headnoun(2,entity(4,lights1),traffic_lights)
| |   +-_252391:modifiers(entity(4,lights1),[lights1],[category(lights1,traffic_lights
| |   - )],2,2)
| |   +-_252455:null
| +-_252478:confidence_attrib_rel(3,entity(1,inter2),entity(4,lights1),_251897^
| - _251900^has(_251897,_251900))
+-_252503:confidence_add(6,3,3)
+-_252512:modifiers(entity(1,inter2),[inter2],[has(inter2,lights1),called(inter2,
- Lowell Street),category(inter2,intersection)],6,8)
+-_252552:modifier(entity(1,inter2),[inter2],[inter2],[has(inter2,lights1),called(
| - inter2,Lowell Street),category(inter2,intersection)],[has(inter2,sign1),has(
| - inter2,lights1),called(inter2,Lowell Street),category(inter2,intersection)],
| - 2)
| +-_252629:salient_attrib_rel(entity(1,inter2),entity(6,sign1),_252644^
| | - _252647^has(_252644,_252647),[has(inter2,lights1),called(inter2,Lowell Street
| | - ),category(inter2,intersection)],[has(inter2,sign1),has(inter2,lights1),
| | - called(inter2,Lowell Street),category(inter2,intersection)])
| +-_252690:s-attrib-rel(entity(1,inter2),entity(6,sign1),_252644^_252647^has(
| | - _252644,_252647))
| +-_252785:ref(entity(6,sign1),sign1)
| +-_252796:subset([inter2],_252805^ab(system,user,apply(apply(_252644^
| | - _252647^has(_252644,_252647),_252805),sign1)),[inter2])
| +-_252831:refer(entity(6,sign1),1)
| | +-_252865:s-refer(entity(6,sign1))
| | +-_252884:describe(entity(6,sign1),1)
| |   +-_252904:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| |   | - street1,street2])
| |   +-_252929:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1
| |   | - ,street2],entity(6,sign1),[sign1],[category(sign1,sign)],1)

```

```

| | | +-_252991:s-attrib(entity(6,sign1),_253009^category(_253009,sign))
| | | +-_253068:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1
| | | | - ,street2],_253009^ab(system,user,category(_253009,sign)),[sign1])
| | | +-_253107:ref(entity(6,sign1),sign1)
| | | +-_253118:[category(sign1,sign)]=[category(sign1,sign)]
| | | +-_253136:confidence_headnoun(1,entity(6,sign1),sign)
| | | +-_253148:modifiers(entity(6,sign1),[sign1],[category(sign1,sign)],
| | | | - 1,1)
| | | +-_253212:null
| | +-_253235:confidence_attrib_rel(2,entity(1,inter2),entity(6,sign1),_252644^
| | | - _252647^has(_252644,_252647))
| | +-_253260:confidence_add(8,6,2)
| | +-_253269:modifiers(entity(1,inter2),[inter2],[has(inter2,sign1),has(inter2,lights1)
| | | - ,called(inter2,Lowell Street),category(inter2,intersection)],8,8)
| | +-_253348:null
| +-_253371:here(inter2,street1,+(1))=here(inter2,street1,+(1))
+-_253391:directions(here(inter2,street1,+(1)),[],here(inter2,street1,+(1)))
+-_253449:null

```

User Model: Adding Proposition

mb(system,user,replace(p1,V1))

V1=_250814:describe-route(route([goto(exit1,inter2,street1,+(1),_306704)]))

```

+-_250914:directions(here(exit1,street1,+(1)),[goto(exit1,inter2,street1,+(1),_307009)],here(
| - inter2,street1,+(1)))
+-_250982:direction(here(exit1,street1,+(1)),goto(exit1,inter2,street1,+(1),_250836),here(inter2
| - ,street1,+(1)))
| +-_251064:ref(entity(1,inter2),inter2)
| +-_251075:s-goto(entity(1,inter2))
| +-_251187:set_context(exit1,inter2,street1,+(1))
| +-_251199:refer(entity(1,inter2),8)
| | +-_251233:s-refer(entity(1,inter2))
| | +-_251252:describe(entity(1,inter2),8)
| | | +-_251272:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,
| | | | - street2])
| | +-_251297:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| | | - entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],1)
| | +-_251361:s-attrib(entity(1,inter2),_251379^category(_251379,intersection))
| | +-_251438:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,street2],
| | | - _251379^ab(system,user,category(_251379,intersection)),[inter1,inter2])
| | +-_251479:ref(entity(1,inter2),inter2)
| | +-_251490:[category(inter2,intersection)]=[category(inter2,intersection)]
| | +-_251508:confidence_headnoun(1,entity(1,inter2),intersection)
+-_251520:modifiers(entity(1,inter2),[inter1,inter2],[category(inter2,intersection)],
| - 1,8)
+-_251552:modifier(entity(1,inter2),[inter1,inter2],[inter2],[category(inter2,
| - intersection)],called(inter2,Lowell Street),category(inter2,intersection)],
| - 2)
| +-_251611:salient_attrib(entity(1,inter2),_251622^called(_251622,Lowell Street),[
| | - category(inter2,intersection)],called(inter2,Lowell Street),category(inter2,
| | - intersection))
| +-_251645:s-attrib(entity(1,inter2),_251622^called(_251622,Lowell Street))
| +-_251722:subset([inter1,inter2],_251733^ab(system,user,apply(_251622^called(
| | - _251622,Lowell Street),_251733)),[inter2])
| +-_251753:confidence_attrib(2,entity(1,inter2),_251622^called(_251622,Lowell Street))
+-_251771:confidence_add(3,1,2)
+-_251780:modifiers(entity(1,inter2),[inter2],[called(inter2,Lowell Street),category(
| - inter2,intersection)],3,8)
+-_251815:modifier(entity(1,inter2),[inter2],[inter2],[called(inter2,Lowell Street),
| - category(inter2,intersection)],has(inter2,lights1),called(inter2,Lowell Street),
| - category(inter2,intersection)],3)

```

```

| | +- _251882:salient_attrib_rel(entity(1,inter2),entity(4,lights1),_251897^
| | | - _251900^has(_251897,_251900),[called(inter2,Lowell Street),category(inter2,
| | | - intersection)],[has(inter2,lights1),called(inter2,Lowell Street),category(
| | | - inter2,intersection)])
| | +- _251933:s-attrib-rel(entity(1,inter2),entity(4,lights1),_251897^_251900^has(
| | | - _251897,_251900))
| | +- _252028:ref(entity(4,lights1),lights1)
| | +- _252039:subset([inter2],_252048^ab(system,user,apply(apply(_251897^_251900^has(
| | | - _251897,_251900),_252048),lights1)),[inter2])
| | +- _252074:refer(entity(4,lights1),2)
| | | +- _252108:s-refer(entity(4,lights1))
| | | +- _252127:describe(entity(4,lights1),2)
| | | | +- _252147:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| | | | - street1,street2])
| | | | +- _252172:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,
| | | | - street2],entity(4,lights1),[lights1],[category(lights1,traffic_lights)],
| | | | - 2)
| | | | | +- _252234:s-attrib(entity(4,lights1),_252252^category(_252252,traffic_lights))
| | | | | +- _252311:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1,
| | | | | - street2],_252252^ab(system,user,category(_252252,traffic_lights)),[
| | | | | - lights1])
| | | | | +- _252350:ref(entity(4,lights1),lights1)
| | | | | +- _252361:[category(lights1,traffic_lights)]=[category(lights1,traffic_lights)
| | | | | - ]
| | | | | +- _252379:confidence_headnoun(2,entity(4,lights1),traffic_lights)
| | | | | +- _252391:modifiers(entity(4,lights1),[lights1],[category(lights1,traffic_lights
| | | | | - )],2,2)
| | | | | +- _252455:null
| | +- _252478:confidence_attrib_rel(3,entity(1,inter2),entity(4,lights1),_251897^
| | | - _251900^has(_251897,_251900))
+- _252503:confidence_add(6,3,3)
+- _252512:modifiers(entity(1,inter2),[inter2],[has(inter2,lights1),called(inter2,
- Lowell Street),category(inter2,intersection)],6,8)
+- _252552:modifier(entity(1,inter2),[inter2],[inter2],[has(inter2,lights1),called(
- inter2,Lowell Street),category(inter2,intersection)],[has(inter2,sign1),has(
- inter2,lights1),called(inter2,Lowell Street),category(inter2,intersection)],
- 2)
| +- _252629:salient_attrib_rel(entity(1,inter2),entity(6,sign1),_252644^
| | - _252647^has(_252644,_252647),[has(inter2,lights1),called(inter2,Lowell Street
| | - ),category(inter2,intersection)],[has(inter2,sign1),has(inter2,lights1),
| | - called(inter2,Lowell Street),category(inter2,intersection)])
| +- _252690:s-attrib-rel(entity(1,inter2),entity(6,sign1),_252644^_252647^has(
| | - _252644,_252647))
| +- _252785:ref(entity(6,sign1),sign1)
| +- _252796:subset([inter2],_252805^ab(system,user,apply(apply(_252644^
| | - _252647^has(_252644,_252647),_252805),sign1)),[inter2])
| +- _252831:refer(entity(6,sign1),1)
| | +- _252865:s-refer(entity(6,sign1))
| | +- _252884:describe(entity(6,sign1),1)
| | | +- _252904:context_current([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,
| | | - street1,street2])
| | | +- _252929:headnoun([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1
| | | - ,street2],entity(6,sign1),[sign1],[category(sign1,sign)],1)
| | | | +- _252991:s-attrib(entity(6,sign1),_253009^category(_253009,sign))
| | | | +- _253068:subset([avenue1,exit1,highway1,inter1,inter2,lights1,sign1,street1
| | | | - ,street2],_253009^ab(system,user,category(_253009,sign)),[sign1])
| | | | +- _253107:ref(entity(6,sign1),sign1)
| | | | +- _253118:[category(sign1,sign)]=[category(sign1,sign)]
| | | | +- _253136:confidence_headnoun(1,entity(6,sign1),sign)

```

```

| | | +-_253148:modifiers(entity(6,sign1),[sign1],[category(sign1,sign)],
| | | | - 1,1)
| | | +-_253212:null
| | | +-_253235:confidence_attrib_rel(2,entity(1,inter2),entity(6,sign1),_252644^
| | | | - _252647^has(_252644,_252647))
| | | +-_253260:confidence_add(8,6,2)
| | | +-_253269:modifiers(entity(1,inter2),[inter2],[has(inter2,sign1),has(inter2,lights1)
| | | | - ,called(inter2,Lowell Street),category(inter2,intersection)],8,8)
| | | +-_253348:null
| +-_253371:here(inter2,street1,+(1))=here(inter2,street1,+(1))
+-_253391:directions(here(inter2,street1,+(1)),[],here(inter2,street1,+(1)))
+-_253449:null

```

```

Popping from focus stack: focus(p1,p20,identify(user,system,entity(1,inter2)))
Popping from focus stack: focus(p1,p13,mb(system,user,place(inter2,_371120,_371121)))
Popping from focus stack: focus(p1,p1,knowroute(user,system,route([goto(exit1,inter2,street1,+(
- 1),1)])))
removing plan p1 from belief space

```

```

User Model: Adding Proposition
plan(system,p123,knowroute(user,system,route([goto(exit1,inter2,street1,+(1),1)])))

```

```

Pushing to focus stack: focus(p123,p123,knowroute(user,system,route([goto(exit1,inter2,street1,+(
- 1),1)])))

```

```

User Model: Adding Proposition
achieve(p123,p123,knowroute(user,system,route([goto(exit1,inter2,street1,+(1),1)])))

```

```

Pushing to focus stack: focus(p123,p135,mb(system,user,place(inter2,_371120,_371121)))

```

```

User Model: Adding Proposition
achieve(p123,p135,mb(system,user,place(inter2,_371120,_371121)))

```

```

Pushing to focus stack: focus(p123,p142,identify(user,system,entity(1,inter2)))

```

```

User Model: Adding Proposition
achieve(p123,p142,identify(user,system,entity(1,inter2)))

```

```

Pushing to focus stack: focus(p123,p180,mb(system,user,has(inter2,lights1)))

```

```

User Model: Adding Proposition
achieve(p123,p180,mb(system,user,has(inter2,lights1)))

```

```

Pushing to focus stack: focus(p123,p189,identify(user,system,entity(4,lights1)))

```

```

User Model: Adding Proposition
achieve(p123,p189,identify(user,system,entity(4,lights1)))

```

```

Pushing to focus stack: focus(p123,p198,mb(system,user,category(lights1,traffic_lights)))

```

```

User Model: Adding Proposition
achieve(p123,p198,mb(system,user,category(lights1,traffic_lights)))

```

```

Pushing to focus stack: focus(p123,p221,mb(system,user,has(inter2,sign1)))

```

```

User Model: Adding Proposition
achieve(p123,p221,mb(system,user,has(inter2,sign1)))

```

```

Pushing to focus stack: focus(p123,p230,identify(user,system,entity(6,sign1)))

```

```

User Model: Adding Proposition
achieve(p123,p230,identify(user,system,entity(6,sign1)))

```

```

Pushing to focus stack: focus(p123,p239,mb(system,user,category(sign1,sign)))

```

```

User Model: Adding Proposition

```

```

achieve(p123,p239,mb(system,user,category(sign1,sign)))

User Model: Adding Proposition
cstate(system,user,p123,knowroute(user,system,route([goto(exit1,inter2,street1,+(1),1)])))

*** cstate updated ***

=====
Checking Goal Rules
=====

Applying g_rule3
goal(system,mb(system,user,achieve(p123,p239,mb(system,user,category(sign1,sign))))))

Pre-empting the planning for this goal

```

B.5 Understanding “*Okay.*”

```

=====
Understanding
=====

-----
Plan Recognizer
-----

Actions = s-accept(p123)

Initial Setup
-----
Adding inactive edge:
Head: s-accept(p123)
Acts: s-accept(p123)

Adding active edge:
Head: accept-plan(_490659)
Need: s-accept(_490659)

Adding config (from active edge):
Active:  accept-plan(_490659)
Inactive: s-accept(p123)

End of Initial Setup
-----

Applying config (0 left, step 1)
-----
Active:  accept-plan(_490659)
Inactive: s-accept(p123)

Adding inactive edge:
Head: accept-plan(p123)
Acts: s-accept(p123)

*** Agenda Empty ***

number of plans found: 2
Number of complete plans found: 1

```

Consider Plan Derivation

accept-plan(p123)
+-s-accept(p123)

Evaluate

<con> achieve(p123,p239,mb(system,user,category(sign1,sign)))
Assuming achieve(p123,p239,mb(system,user,category(sign1,sign))) due to effects

Inferred Plan

_509223:accept-plan(p123)
+_-509248:s-accept(p123)

User Model: Adding Proposition
plan(user,p269,mb(system,user,achieve(p123,p239,mb(system,user,category(sign1,sign))))))

Pushing to focus stack: focus(p269,p269,mb(system,user,achieve(p123,p239,mb(system,user,category(sign1
- ,sign))))))

User Model: Adding Proposition
achieve(p269,p269,mb(system,user,achieve(p123,p239,mb(system,user,category(sign1,sign))))))

=====
Checking Acceptance and Collaborative Rules
=====

Applying m_accept_rule1
Popping from focus stack: focus(p269,p269,mb(system,user,achieve(p123,p239,mb(system,user,category(
- sign1,sign))))))
User Model: Adding Proposition
mb(system,user,achieve(p123,p239,mb(system,user,category(sign1,sign))))

Applying m_accept_rule1
Popping from focus stack: focus(p123,p239,mb(system,user,category(sign1,sign)))
User Model: Adding Proposition
mb(system,user,category(sign1,sign))

=====
Understanding
=====

Plan Recognizer

Actions = s-accept(p123)

number of plans found: 2
Number of complete plans found: 1

Consider Plan Derivation

accept-plan(p123)
+-s-accept(p123)

Evaluate

<con> achieve(p123,p230,identify(user,system,entity(6,sign1)))
Assuming achieve(p123,p230,identify(user,system,entity(6,sign1))) due to effects

Inferred Plan

_516690:accept-plan(p123)
+_-_516715:s-accept(p123)

User Model: Adding Proposition

plan(user,p276,mb(system,user,achieve(p123,p230,identify(user,system,entity(6,sign1)))))

Pushing to focus stack: focus(p276,p276,mb(system,user,achieve(p123,p230,identify(user,system,entity(6,sign1)))))

User Model: Adding Proposition

achieve(p276,p276,mb(system,user,achieve(p123,p230,identify(user,system,entity(6,sign1)))))

=====
Checking Acceptance and Collaborative Rules
=====

Applying m_accept_rule1

Popping from focus stack: focus(p276,p276,mb(system,user,achieve(p123,p230,identify(user,system,entity(6,sign1)))))

User Model: Adding Proposition

mb(system,user,achieve(p123,p230,identify(user,system,entity(6,sign1)))))

Applying m_accept_rule1

Popping from focus stack: focus(p123,p230,identify(user,system,entity(6,sign1)))

User Model: Adding Proposition

identify(user,system,entity(6,sign1))

=====
Understanding
=====

Plan Recognizer

Actions = s-accept(p123)

number of plans found: 2

Number of complete plans found: 1

Consider Plan Derivation

```
accept-plan(p123)
+-s-accept(p123)
```

```
-----
Evaluate
-----
```

```
<con> achieve(p123,p221,mb(system,user,has(inter2,sign1)))
Assuming achieve(p123,p221,mb(system,user,has(inter2,sign1))) due to effects
```

```
Inferred Plan
-----
```

```
_525287:accept-plan(p123)
+-_525312:s-accept(p123)
```

```
User Model: Adding Proposition
plan(user,p283,mb(system,user,achieve(p123,p221,mb(system,user,has(inter2,sign1))))))
```

```
Pushing to focus stack: focus(p283,p283,mb(system,user,achieve(p123,p221,mb(system,user,has(inter2,
- sign1))))))
```

```
User Model: Adding Proposition
achieve(p283,p283,mb(system,user,achieve(p123,p221,mb(system,user,has(inter2,sign1))))))
```

```
=====
Checking Acceptance and Collaborative Rules
=====
```

```
Applying m_accept_rule1
Popping from focus stack: focus(p283,p283,mb(system,user,achieve(p123,p221,mb(system,user,has(inter2,
- sign1))))))
User Model: Adding Proposition
mb(system,user,achieve(p123,p221,mb(system,user,has(inter2,sign1))))
```

```
Applying m_accept_rule1
Popping from focus stack: focus(p123,p221,mb(system,user,has(inter2,sign1)))
User Model: Adding Proposition
mb(system,user,has(inter2,sign1))
```

```
=====
Understanding
=====
```

```
-----
Plan Recognizer
-----
```

```
Actions = s-accept(p123)
```

```
number of plans found: 2
Number of complete plans found: 1
```

```
-----
Consider Plan Derivation
-----
```

```
accept-plan(p123)
```



```

+-s-accept(p123)
-----
Evaluate
-----

<con> achieve(p123,p198,mb(system,user,category(lights1,traffic_lights)))
Assuming achieve(p123,p198,mb(system,user,category(lights1,traffic_lights))) due to effects

Inferred Plan
-----

_532474:accept-plan(p123)
+-_532499:s-accept(p123)

User Model: Adding Proposition
plan(user,p290,mb(system,user,achieve(p123,p198,mb(system,user,category(lights1,traffic_lights)))))

Pushing to focus stack: focus(p290,p290,mb(system,user,achieve(p123,p198,mb(system,user,category(
- lights1,traffic_lights)))))
User Model: Adding Proposition
achieve(p290,p290,mb(system,user,achieve(p123,p198,mb(system,user,category(lights1,traffic_lights)))))

=====
Checking Acceptance and Collaborative Rules
=====

Applying m_accept_rule1
Popping from focus stack: focus(p290,p290,mb(system,user,achieve(p123,p198,mb(system,user,category(
- lights1,traffic_lights)))))
User Model: Adding Proposition
mb(system,user,achieve(p123,p198,mb(system,user,category(lights1,traffic_lights))))

Applying m_accept_rule1
Popping from focus stack: focus(p123,p198,mb(system,user,category(lights1,traffic_lights)))
User Model: Adding Proposition
mb(system,user,category(lights1,traffic_lights))

=====
Understanding
=====

-----
Plan Recognizer
-----

Actions = s-accept(p123)

number of plans found: 2
Number of complete plans found: 1

-----
Consider Plan Derivation
-----

accept-plan(p123)
+-s-accept(p123)

```

Evaluate

<con> achieve(p123,p189,identify(user,system,entity(4,lights1)))
Assuming achieve(p123,p189,identify(user,system,entity(4,lights1))) due to effects

Inferred Plan

_539514:accept-plan(p123)
+_-539539:s-accept(p123)

User Model: Adding Proposition
plan(user,p297,mb(system,user,achieve(p123,p189,identify(user,system,entity(4,lights1)))))

Pushing to focus stack: focus(p297,p297,mb(system,user,achieve(p123,p189,identify(user,system,entity(4,lights1)))))

User Model: Adding Proposition
achieve(p297,p297,mb(system,user,achieve(p123,p189,identify(user,system,entity(4,lights1)))))

=====
Checking Acceptance and Collaborative Rules
=====

Applying m_accept_rule1
Popping from focus stack: focus(p297,p297,mb(system,user,achieve(p123,p189,identify(user,system,entity(4,lights1)))))
User Model: Adding Proposition
mb(system,user,achieve(p123,p189,identify(user,system,entity(4,lights1))))

Applying m_accept_rule1
Popping from focus stack: focus(p123,p189,identify(user,system,entity(4,lights1)))
User Model: Adding Proposition
identify(user,system,entity(4,lights1))

=====
Understanding
=====

Plan Recognizer

Actions = s-accept(p123)

number of plans found: 2
Number of complete plans found: 1

Consider Plan Derivation

accept-plan(p123)
+-s-accept(p123)

Evaluate

<con> achieve(p123,p180,mb(system,user,has(inter2,lights1)))
Assuming achieve(p123,p180,mb(system,user,has(inter2,lights1))) due to effects

Inferred Plan

_547699:accept-plan(p123)
+_-547724:s-accept(p123)

User Model: Adding Proposition

plan(user,p304,mb(system,user,achieve(p123,p180,mb(system,user,has(inter2,lights1))))))

Pushing to focus stack: focus(p304,p304,mb(system,user,achieve(p123,p180,mb(system,user,has(inter2,
- lights1))))))

User Model: Adding Proposition

achieve(p304,p304,mb(system,user,achieve(p123,p180,mb(system,user,has(inter2,lights1))))))

=====
Checking Acceptance and Collaborative Rules
=====

Applying m_accept_rule1

Popping from focus stack: focus(p304,p304,mb(system,user,achieve(p123,p180,mb(system,user,has(inter2,
- lights1))))))

User Model: Adding Proposition

mb(system,user,achieve(p123,p180,mb(system,user,has(inter2,lights1))))

Applying m_accept_rule1

Popping from focus stack: focus(p123,p180,mb(system,user,has(inter2,lights1)))

User Model: Adding Proposition

mb(system,user,has(inter2,lights1))

=====
Understanding
=====

Plan Recognizer

Actions = s-accept(p123)

number of plans found: 2

Number of complete plans found: 1

Consider Plan Derivation

accept-plan(p123)
+-s-accept(p123)

Evaluate

<con> achieve(p123,p142,identify(user,system,entity(1,inter2)))
Assuming achieve(p123,p142,identify(user,system,entity(1,inter2))) due to effects

Inferred Plan

_554457:accept-plan(p123)
+_-554482:s-accept(p123)

User Model: Adding Proposition

plan(user,p311,mb(system,user,achieve(p123,p142,identify(user,system,entity(1,inter2))))))

Pushing to focus stack: focus(p311,p311,mb(system,user,achieve(p123,p142,identify(user,system,entity(1,inter2))))))

User Model: Adding Proposition

achieve(p311,p311,mb(system,user,achieve(p123,p142,identify(user,system,entity(1,inter2))))))

=====
Checking Acceptance and Collaborative Rules
=====

Applying m_accept_rule1

Popping from focus stack: focus(p311,p311,mb(system,user,achieve(p123,p142,identify(user,system,entity(1,inter2))))))

User Model: Adding Proposition

mb(system,user,achieve(p123,p142,identify(user,system,entity(1,inter2))))

Applying m_accept_rule1

Popping from focus stack: focus(p123,p142,identify(user,system,entity(1,inter2)))

User Model: Adding Proposition

identify(user,system,entity(1,inter2))

=====
Understanding
=====

Plan Recognizer

Actions = s-accept(p123)

number of plans found: 2

Number of complete plans found: 1

Consider Plan Derivation

accept-plan(p123)
+-s-accept(p123)

Evaluate

<con> achieve(p123,p135,mb(system,user,place(inter2,_562575,_562576)))
Assuming achieve(p123,p135,mb(system,user,place(inter2,_562575,_562576))) due to effects

Inferred Plan

_562354:accept-plan(p123)
+_-562379:s-accept(p123)

User Model: Adding Proposition

plan(user,p318,mb(system,user,achieve(p123,p135,mb(system,user,place(inter2,_563940,_563941))))))

Pushing to focus stack: focus(p318,p318,mb(system,user,achieve(p123,p135,mb(system,user,place(inter2,
- _562575,_562576))))))

User Model: Adding Proposition

achieve(p318,p318,mb(system,user,achieve(p123,p135,mb(system,user,place(inter2,_562575,_562576))))))

=====

Checking Acceptance and Collaborative Rules

=====

Applying m_accept_rule1

Popping from focus stack: focus(p318,p318,mb(system,user,achieve(p123,p135,mb(system,user,place(inter2
- ,_566267,_566268))))))

User Model: Adding Proposition

mb(system,user,achieve(p123,p135,mb(system,user,place(inter2,_566267,_566268))))

Applying m_accept_rule1

Popping from focus stack: focus(p123,p135,mb(system,user,place(inter2,_567481,_567482)))

User Model: Adding Proposition

mb(system,user,place(inter2,_567481,_567482))