Theta Roles

Linguistics 322/481
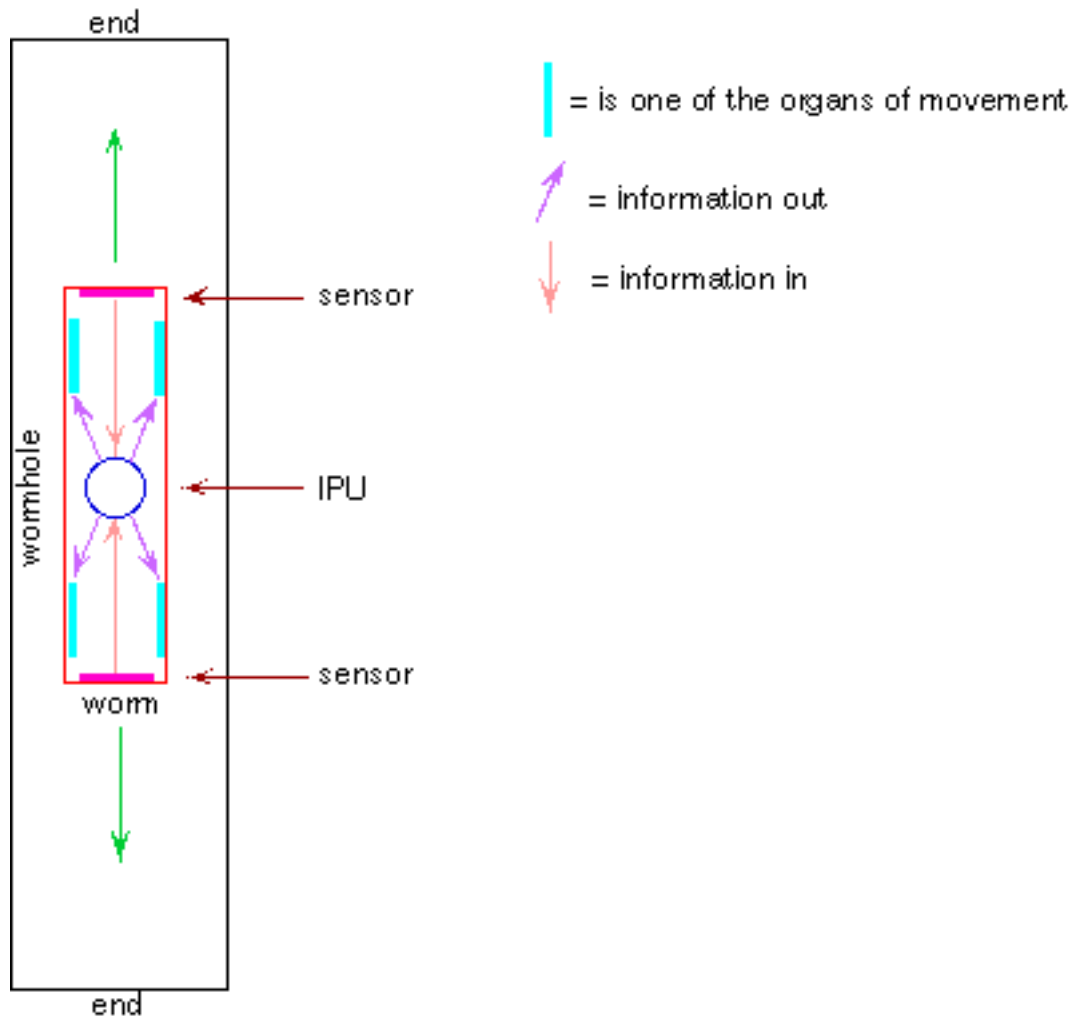
Intermediate Syntax

1   Introduction

Theta roles are the names of the participant roles associated with a predicate: the predicate may be a verb, an adjective, a preposition, or a noun. The participant is usually said to be an argument of the predicate.

2   The Wormhole Example (semantic roles)

In the first one imagine a circular wormhole. In this wormhole there is one worm that constantly moves through this wormhole. The worm constantly sends out information to that part of his body that accounts for his movement. The worm keeps moving never stopping or doing anything else. This is as simple a situation as can be imagined which involves information transmission. Note that we are overlooking the death/alive factor. In the simplest scenario, this is not a factor. Here, the worm is an agent. It is sending out information by means of its IPU. The entire worm is a theme as it is moving with no observable internal change.

Wormhole (1)

(1)

In the second scenario, suppose a human is crawling through the wormhole instead of a worm. All we are interested in here is the fact that the human sends a message by means of its IPU to certain muscles that induce the motion which English speakers refer to as 'crawl.' Only one message is sent out. Note that the IPU of humans and all higher organisms is called a brain. There is no formal difference between these first two scenarios--the only difference is in what we perceive of as a worm or as a human.

In the third scenario, suppose that a a minicomputer is in the wormhole. It is sending out only one bit of information repeatedly by means of its IPU to a some part of it that causes the minicomputer to move through the wormhole. The IPU of a computer is not called a

brain. In the definition of agent adopted here, the computer is an agent. (We ignore here the interesting and often discussed issue of what differentiates a humans, worms, and computers.)

Nevertheless, the three scenarios are the same. Each movable form has an IPU that sends out one bit of information to some form that is the direct cause of movement. The IPU is the agent. In normal language, we refer to the entire body containing the IPU as the agent:

(2)   The human crawls through the wormhole.

As long as the human brain functions and sends information to the hands and feet, we say that the human is the agent as in (2). The human body is the theme of the motion, not the brain. The brain is a theme in respect to the worm: it is located inside the worm. Note that in (44a) the subject is not an agent. The subject we discuss in the following section.

3   Semantic theta roles

Semantically there are a large number of theta roles. We discuss some of them here. In the syntax we are able to collapse these into fewer units.

3.1   Agent versus Experiencer

To explain agent and experiencer, let us start with the following scenario. Imagine a wormhole that is straight and has two ends. Next imagine that there is a worm that moves through the wormhole from one end to the other. But when it reaches the end, it can no longer move. Suppose next that the worm has an information processing unit (IPU) (or a CPU (a central processing unit)). This IPU we may call the brain of the worm. The worm also has two sensors, one at each end of his body. When the worm comes into contact with the end wall of the wormhole, the sensor at the point of contact picks up this information and sends the information to the IPU of the worm (through his neural system). Now imagine that the worm is now able to send one of two messages to its body. Move and Reverse Movement. When the worm receives the information that it has reached the end of the wormhole, it send the message to its body to reverse the direction, and then it send out the

message to move. When the worm reaches the other end of the wormhole, the same process is repeated.

We will call the IPU an experiencer when it receives information and an agent when it submits information. The body of the worm is still a theme. Technically the sensor acts as an experiencer when it senses the end of the wormhole, and as an agent when this information is passed to the IPU. Thus, we now have several events:

(3) a.   MOVE <theme: WORM>

b.   REACH <goal: END-of-WORMHOLE> <agent/theme: WORM> = IN-FORMATION-1

c.   TOUCH <theme: END-of-WORMHOLE>

d.   ACTIVATE < experiencer: SENSOR>

e.   TRANSMIT <theme: INFORMATION-1> <goal: IPU> <agent: SENSOR>

f.   RECEIVE <experiencer: IPU> <theme: INFORMATION-1>

g.   PROCESS <agent: IPU> <theme: INFORMATION-1>

h.   TRANSMIT <theme: INFORMATION-2> <goal: ORGANS-of-DIREC-TION REVERSAL> <agent: IPU>

i.   TRANSMIT <theme: INFORMATION-3> <goal: ORGANS-of-MOVE-MENT> <agent: IPU>

j.   MOVE <theme: WORM>.

k.   [Repeat].

INFORMATION-1 is the reaching of the end of the wormhole, INFORMATION-2 is to change direction, and INFORMATION-3 is to move. This chain of events will repeat endlessly without any further information brought in. Even if the worm should die, that is additional information.

Every term that is in caps is called a predicate. Certain predicates are events and certain ones objects. The objects appears as arguments of one or more events.

The experiencer is distinct from the agent. It is possible for the IPU to receive information and not respond to it. For example, consider:

(4)   John felt cold.

(4) is ambiguous. In the intended reading John is experiencing being cold. John is the experiencer. Something is sending him the information that he is experiencing this condition. But in (18) John is doing nothing about it. John is an experiencer only in (5a). In the second reading, (5b), John feels cold to the touch. That is someone else is experiencing John's coldness. John's body is cold. We do not know if John is experiencing being cold or not. John could be dead, in which case his IPU (brain) is not function and it is neither receiving messages or submitting messages (tense and other verbal operators are ignored here):

(5)   a.   FEEL <experiencer: JOHN> <[STATE] COLD>>.
       b.   FEEL <[STATE] <COLD <theme: JOHN> <experiencer: X>.

(5b) is more complex that what I have written. John is experiencing the state of being cold. Semantically, John has the be the experiencer of feeling cold, and he has to be in the state of being cold. In the argument structure only one of the arguments with an identical referent appears. We assume the subject of the sentence to be the argument of FEEL--the experiencer. In (5b) an experiencer is implied, but not stated, though it can be as in (6) where the mortician is the experiencer:

(6)   John felt cold to the mortician.

Normally, we perceive of animals and humans as experiencers but not computers. The computer is an experiencer in the following situation. When the minicomputer reaches the end bumping into it, a message is sent to the IPU of the computer that the end has been reached. The computer then sends out a message to some mechanism (an instrument) that reverses the direction of it. Then the computer sends out the message 'Move.' Perhaps the difference between animals and computers is that the former have free will, but the latter do not except in science fiction situations such the computer Hal in the movie "2001."

In the following sentence:

(7)   John saw Mary.

seeing is an experiential event. The seer is receiving information: the object seen. The object seen is the theme. The seer is not sending out information--he is not an agent. (Perhaps in a more technical sense, the object seen is the source; the information passed to the brain is the theme. I do not think it is necessary to go into this level of detail here.)

3.2   Instrument

Let us suppose that this particular species of worm has teeth. When the worm reaches the end of the wormhole, it receives that message, and then it sends a message to the tooth muscles (or whatever) to bite into the end, tear off a bit of the end, and then consume it. The teeth and associated organs are an instrument (perceptually, we humans often see the teeth as the instrument, passing over the muscles involved):

(8)   a.   The worm ate a bit of the wormhole end with its teeth.

       b.   [TENSE [+Past] < EAT <theme: BIT of WORMHOLE END> <instru-
             ment: TEETH> >].

The instrument has no IPU. It receives a message, but it cannot process it. If the message comes in, the teeth must sink into the end of the wormhole. In this way we distinguish between agent and instrument. In a sentence such as:

(9)   a.   (23)   The wind blew down the tree,

       b.   (24)   [TENSE [+Past] < BLOW <theme: TREE> <position-goal:
             DOWN> <instrument WIND>].

it is assumed that the wind has no IPU. If true, then the wind is an instrument, not an agent. It has been noted in the literature that the following sentence is ambiguous:

(10)   a.   (25)   Bill broke the window.

       b.   (26)   [TENSE [+Past] < BREAK <patient: WINDOW> <agent: BILL>].

       c.   (27)   [TENSE [+Past] < BREAK <patient: WINDOW> <instrument:
             BILL>].

In one reading Bill is the agent. In the other (uncommon) reading, Bill's body is an instrument in that somehow it went through the window, but Bill had nothing to do with it. Bill did not send out a message to some part of his body to propel his body through the window. Or, Bill broke the window when he fell through it.

Bill is an instrument here unless he intentionally fell through the window with the intent of breaking it. The instrument occurs as the direct object of the verb use:

(11)　a.　(28)　Seymour sliced the salami with a knife.

　　　　b.　(29)　Seymour used a knife to slice the salami.

　　　　c.　(30)　John used a rock to beat the window.

　　　　d.　(31)　Mary used a colander to drain the spaghetti noodles.

　　　　e.　(32)　The worm used his teeth to chew of a bit of the wormhole.

Returning to the wormhole example, the organs of movement are each an instrument:

(12)　a.　The worm moves through the wormhole with its movement organs.

　　　　b.　The worm uses its movement organs to move through the wormhole.

Ignoring for the moment through the wormhole; the logical structure for (12b) is the following:

(13)　　　　[TENSE [-Past] < MOVE <agent: WORM> <instrument: ITS MOVE-MENT ORGANS>].

These organs do not have an IPU. Therefore, they can function neither as an agent or an experiencer. But they can function as an instrument. Sometimes an object can function as an agent or an instrument:

(14)　a.　John broke the window with a hammer.

　　　　b.　John broke the window when he was thrown through it.

In (14a) a hammer is the instrument since it has no IPU, and John is the agent since he uses his IPU to make arms and various organs to cause the hammer to break the window. In (14b)

John is not an agent but an instrument. John's IPU has nothing directly to do with his body being thrown through the window. Sentence (15) is ambiguous:

(15)   John broke the window when he fell through it.

If John accidentally fell through the window, he is a theme as long as he did nothing to cause himself to fall through the window. If John intentionally fell through it, he an agent, and if his intention was to use his body to break the window, then he (his body) is an instrument.

3.3   Possessor

The theta role possessor refers to an object that one has, owns, possesses, or belongs to someone:

(16)   John has a book.

Book must be a theme. It sends out no messages and it receives no messages, and it does not undergo a change of state (see patient below):

(17)   [TENSE [-Past] < HAVE <possessor: JOHN> <theme: <BOOK> >].

Let's return to the worm hole:

(18) a.   The worm has two sensors.
      b.   He has four organs of movement and an IPU.

Thus, the worm is a possessor; what he possesses are themes.

While the default for possession is to mark the possessor for subject assignment (prominence), what is interesting about the possessor is that it can be marked by the preposition to in English and dative constructions in other languages:

(19)   The dilapidated Lamborghini belongs to Cynthia.

Cynthia is the possessor of the Lamborghini. The item possessed, the book in (16) and the Lamborghini in (19), is assigned by the default rule to level one, the direct object position. Let us consider the possessor a goal. In the default cases it is marked for subject as-

signment. In the non-default cases the theme is marked for subject assigned and the goal is marked by the preposition to:

(20)

default

$$[+St, +Poss] \quad [+Dir] \quad => \quad \boxed{\text{Go, [+Prom]}} \quad = \text{2nd level}$$

$$[-Dir] \quad => \quad \boxed{\text{Theme}} \quad = \text{1st level}$$

- -

non-default

$$[+St, +Poss] \quad [+Dir] \quad => \quad \boxed{\textit{to} \text{ Go}} \quad = \text{2nd level}$$

$$[-Dir] \quad => \quad \boxed{\text{Theme, [+Prom]}} \quad = \text{1st level}$$

3.4   Patient

Another common theta role is the patient. The patient is something or somebody that undergoes a change specifically implied by the verb. Note that John in (71) is a also a patient in that he underwent a change in state. Other patients include:

(21)   a.   Mary burned the scallops.

b.   Kelly painted the fence.

In (21a) the scallops is the patient, since it underwent a change; in (21b) the fence is a patient since it underwent a change (in colour). A patient occurs in the following slot:

(22)   What did X do to the _____?

(23)   a.   (45)   What did Mary do to the scallops? She burned them.

b.   (46)   What did Kelly do to the fence? He painted it.

In the above wormhole scenario there is no patient. There does not undergo an observable internal change. Suppose that the worm has a mouth and can eat a bit of the end of the wormhole and then reverses his direction. As a result of eating a bit of the end of the wormhole, the worm grows a millimeter. The worms is a patient in the sentence:

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(24)   (47)   The worm grew an inch.

Of course, the worm is an agent in

(25)   (48)   The worm ate a bit of the wormhole end.

And the wormhole end is also a patient. Note that the verb eat does not refer directly to an experience. The experience is inferred. When the worm reaches the end of the wormhole, it receives the information that it has reached the end, and then the worm sends out information to the proper organ to eat a bit of the end.

Note that in the depiction of the wormhole given above, there is no patient. The worm does not undergo a change of state.

3.5   Constructum.

The theta role result is not a commonly recognized theta role. It refers to object that come into existence as a consequence of the assigning predicate. Consider the following sentences:

(26)   a.   John baked a cake.
          b.   Mary built a coffee table.
          c.   Mrs. Jones created a mess.
          d.   Noah constructed a huge ark.

The objects cake, coffee table, mess, and huge ark are the result of doing something. These objects did not exist before the time point of the event, but only after it and as a result of it. In some sense this is related to goal.

3.6   Destructum

The theta role destructum is not known to have been proposed. It refers to objects that cease to exist as such as a consequence of the assigning predicate. Consider the following sentences.:

(27) a. The enemy destroyed the city.

    b. Some Doukhobor burned his house down.

    c. A tornado leveled the town.

    d. Jimmy Hoffa was rubbed out.

The city, his house, the town, and Jimmy Hoffa are destructa, since they no longer exist.

3.7 Trigger

Differentiating between instrument and trigger is somewhat difficult. The trigger (perceptually) is what actually triggers an activity or accomplishment. An instrument is an aid and is more closely associated with the action (if external) than the subject, but trigger is not an aid. Trigger is often marked by a PP whose had is from:

(28) a. John died from the poison.

    b. Mary got sick from the improperly cooked food.

    c. My bother's arm became swollen from the mosquito bite.

    d. Bill's dog got sick from eating too much food.

In (28a) the poison is not an instrument since it is not necessarily the case that someone used it to poison John. John could have accidentally eaten something contaminated with the poison. Compare (28a) with:

(29) a. Mary killed John with the poison.

    b. *Mary killed John from the poison.

    c. *John died with the poison.

In (29a) Mary uses the poison as an instrument to kill John. Here poison is an instrument. But note one cannot say (29b) where from implies a trigger, not an instrument. And it (29c) the verb die cannot take an instrument, only a trigger. Part of the difference between die and kill is that the latter takes an instrument, the former a trigger. Die is an achievement verb, whereas kill is an accomplishment verb.

3.8   Reason

Another theta role is reason. The English words because and since mark reason:

(30)   a.   John went home because he was cold.

b.   Mary sold her books because she failed syntax.

c.   Since it was raining we decided to delay the picnic.

d.   Since Bill once got sick on rattlesnake eggs, he has not been able to eat them.

Now, let us look at the wormhole scenario. In the simplest case, the worm moves through the wormhole without end. There is no cause and effect. That it moves seems to be the case without cause and effect. It is not evident to the casual observer that the worm may be programmed to do so. It is like the universe: it is because it is.

Next let us look at the second scenario. The worm bumps into the end. A message is sent to its IPU. Then the worm send out the message Reverse Movement. There is a cause and effect relation ship here. The first message is the cause of the second message--the effect.

3.9   Purpose

The last theta role known to us is purpose. Purpose is the goal associated with an activity or accomplishment:

(31)   a.   Mary went to the story for some milk.

b.   John sold his car in order to save the atmosphere.

c.   Popeye eats spinach so that he will become stronger.

In the wormhole scenario, there is no purpose. The programmed to move, but no purpose has been indicated. Now, if it were the case that the worm got a morsel of nourishment (food) each time he hit the sensor, and if he didn't he would die, then his purpose would be to obtain food to remain alive.

(32)   The worm moves through the wormhole to get food.
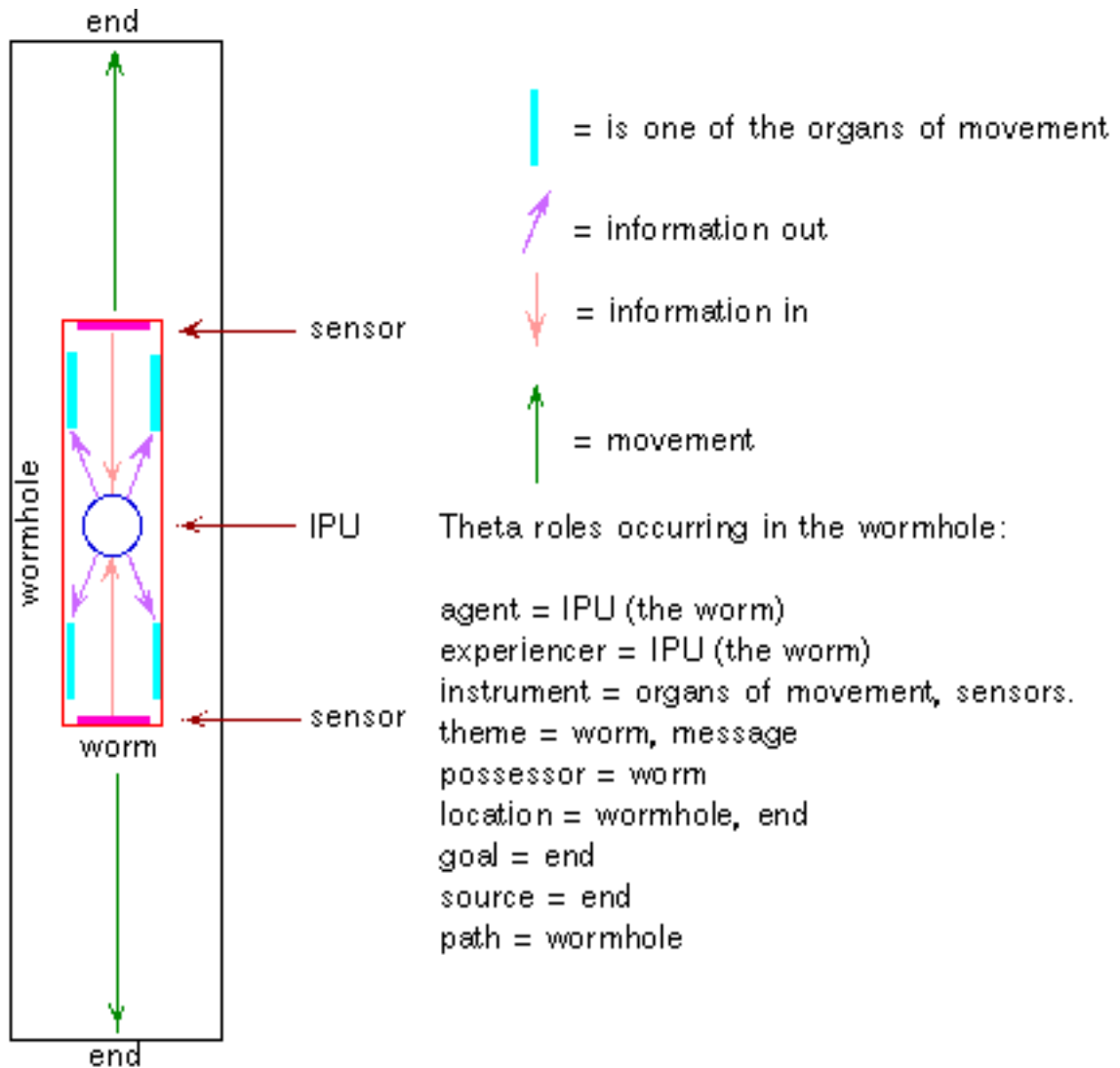
3.10   Benefactor

The benefactor is the one who benefits from a particular activity or accomplishment:

(33)   a.   Mary went to the store for her mother.

        b.   John waxed the Cadillac for his father.

In (33a) her mother is the benefactor--Mary's going to the store is a benefit for her mother.
In (33b) his father is the benefactor.

4 The wormhole revisited.

end

= is one of the organs of movement

= information out

= information in

= movement

sensor

IPU

sensor

worm

wormhole

end

Theta roles occurring in the wormhole:

agent = IPU (the worm)
experiencer = IPU (the worm)
instrument = organs of movement, sensors.
theme = worm, message
possessor = worm
location = wormhole, end
goal = end
source = end
path = wormhole

Lexical propositions occurring in the wormhole:

MOVE <agent: WORM> <path: WORMHOLD> <goal: END_1> <source: END_2>

POSSESS <possessor: WORM> <theme: IPU, SENSOR, ORG-OF-MOVE>
SENSE <experiencer: IPU> <instrument: <SENSOR>
TRANSMIT <theme: MESSAGE> <goal: IPU> <source: SENSOR>
CONTAIN <theme: MESSAGE> <location: IPU>
TRANSMIT <theme: MESSAGE> <goal: ORG-OF-MOVE> <source: IPU>
REVERSE <theme: DIRECTION>
MOVE <agent:WORM> <path:W ORMHOLE> <goal:END_2> <source:END_1>
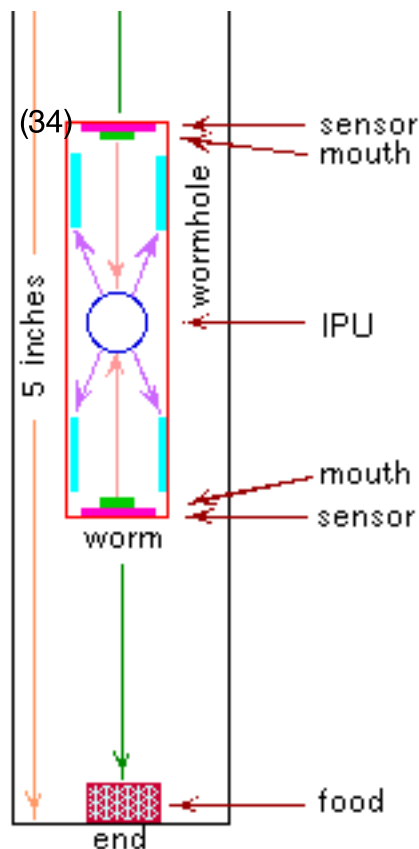
IN <location: WORMHOLE> <theme: WORM>
AT <location: END> <theme: WORM>
BETWEEN <<location: END_1> <location: END_2>> <theme: WORM>

Theta roles play an important role in NP raising and Case theory (topics for L322). The above is a sketch of theta roles. Theta roles are closely tied to the meaning of the predicate that assigns the theta role of each argument.

5   More on Theta Roles

In our first look at the wormhole, not all theta roles were covered because of the limited range of the worm in the wormhole. Let us add the object food to the wormhole. Let's put food at each end of the wormhole. The worm must eat to stay alive. He now has a purpose for moving in the wormhole: to obtain nourishment in order to stay alive. The worm is own benefactor when it eats, although if a verb implies a self-benefactor, the self-benefactor is rarely marked as an overt theta-role. When the food is gone, the worm comes in contact with the end, in which case he reverses his direction as before. If the worm doesn't eat, he will die. Then he will decompose. Additionally, let's add "five inches" as the length of the wormhole. The worm moves five inches through the wormhole from one end to the other-- five inches is a measure theta role.

5.1   The expanded Wormhole.

(34)

= information out

= information in

= movement

Theta roles occurring in the wormhole:

agent = IPU (the worm)
experiencer = IPU (the worm)
instrument = organs of movement, sensors.
theme = worm, message, food
possessor = worm
location = wormhole, end
goal = food, end
source = end
path = wormhole
purpose = eat food
reason = hunger
trigger = lack of food
patient = worm
destructum = worm, food
constructum = fuel
measure = 5 inches

New Lexical propositions occurring in the wormhole:

HUNGRY <experiencer: WORM>
MOVE <agent:WORM> <goal: FOOD> <measure: 5 INCH>
PURPOSE: <EAT: <theme: FOOD> <agent: WORM>>
EAT <agent:WORM> <theme: FOOD> (<benefactor: WORM>)
CONVERT <agent: WORM> <destructum: FOOD> <constructum: FUEL>
REASON <HUNGRY <experiencer: WORM>>
TOUCH <goal: END> <agent: WORM>
NOT <EAT <theme: FOOD> <agent> WORM>
DIE <patient: WORM> <trigger: NO FOOD>
DECOMPOSE <destructum: WORM>

Note:
Some predicates or operators take another predicate as their argument. In this wa
the wormhole scenario becomes more complex. We are letting this worm have two
mouths to keep other things simple. Since we are not looking at its internal organ
including those of eating, we avoid the complications that might arise there.

Adding a mouth has certainly increased the number of theta roles. And it has increased the number of predicates. We have chosen to ignore whatever other organs the worm might need to process his food. We went as far as converting FOOD into FUEL, which he needs to move, stay alive, and so forth. This is to illustrate the role constructum.

6   Adjectival Theta Roles:

The argument of most adjectives is a theme:

(35)   a.   Tom is hot (to the touch).

        b.   The book is red.

        c.   Our house is large.

        d.   Some streets are wide.

        e.   That road is long.

        f.   Lead is heavy and poisonous <-- Lead is heavy and lead is poisonous.

The argument of some adjectives is an experiencer:

(36)   a.   Tom is hot (his experience).

        b.   Mary Ann is happy.

        c.   Our neighbors are very angry.

        d.   Bill's dog is smart.

        e.   (12) Holly was rather depressed.

Some adjectives take two arguments

(37)   a.   Ross is proud of his son. (experiencer and theme):

        b.   Nellie is angry at her neighbors. (experiencer and goal):

        c.   The chick is anxious to eat. (experiencer and proposition).

(Note some consider proposition a theta role and others do not.)

7 The argument of some nouns is a theme as in container nouns:

(38) a. a cup of tea.

   b. a bottle of hootch

   c. a box of matches

   d. a sack of potatoes

   e. (20) a carton of cancer sticks.

Nouns of the ruler-controller class assign themes:

(39) a. the King of Siam

   b. the mayor of Katmandu

   c. the chairman of the board

   d. the ruler of the principality

   e. (25) a vice-president of the company.

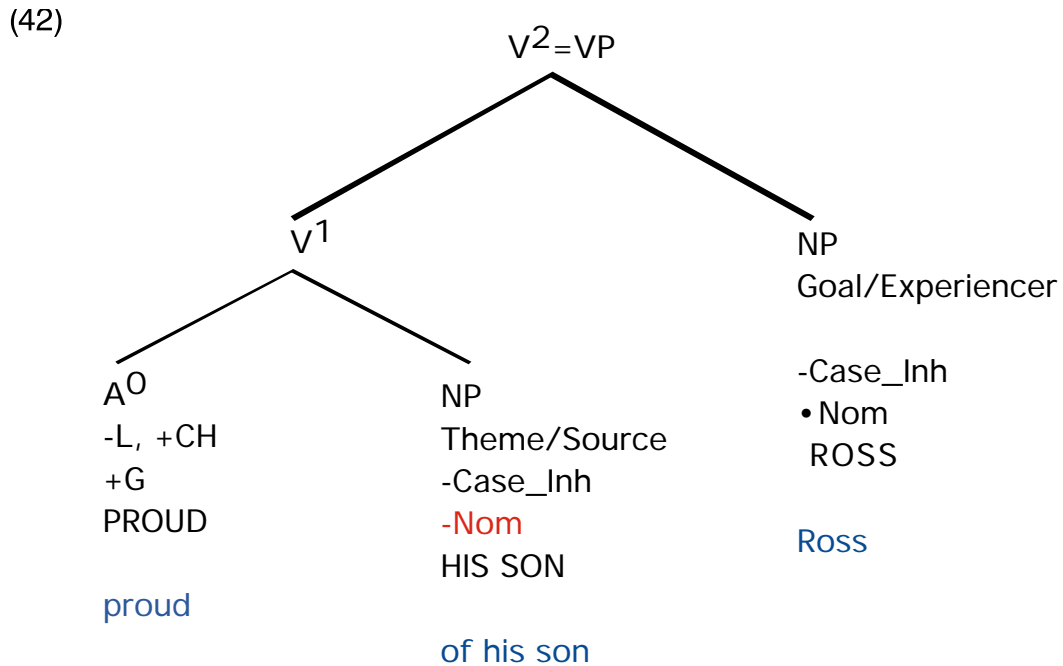Nouns of the whole/part class assign one theta role:

(40) a. (26) the top of the desk

   b. one side of the bed

   c. the underside of Bill's tongue.

Nouns of the relation class assign two theta roles:

(41) a. Jane is the mother of Alice.

   b. Jack is the son of Bob.

   c. My orange cat is the brother of my gray and orange cat.

The partial argument structure of (37a) is the following:

(32)#

(42)

$$V^2 = VP$$

V¹   NP
Goal/Experiencer

A⁰
-L, +CH
+G
PROUD

proud

NP
Theme/Source
-Case_Inh
-Nom
HIS SON

of his son

-Case_Inh
• Nom
ROSS

Ross

- V²=VP dominates V¹ and NP (Goal/Experiencer)
- NP Goal/Experiencer: -Case_Inh, • Nom, ROSS, *Ross*
- V¹ dominates A⁰ and NP (Theme/Source)
- A⁰: -L, +CH, +G, PROUD, *proud*
- NP Theme/Source: -Case_Inh, -Nom, HIS SON, *of his son*

8   State and Change arguments

8.1   Theme

If an object is in motion or in a steady state as the speakers perceives the state, or it is the topic of discussion, it is called a theme:

(43)   a.   The book is blue.

         b.   The ball rolled away.

         c.   Did you see Molly?

In (1) the book is the theme, in (2) the ball is the theme, and in (3), Molly is the theme. In the latter case Molly is the topic of conversation; you is an experiencer. The theme does not imply a information processing unit (IPU)--see next two sections.

(44)   a.   [TENSE [-Past] < BLUE <theme: BOOK> >]

         b.   [TENSE [+Past] < ROLL <theme: BALL> <source: AWAY> >].

         c.   [TENSE [+Past] < SEE <theme: MOLLY> <experiencer: YOU> >].

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The default position for the theme is the complement of V0 or A0--the internal argument position:

(45)　　a.　　(7)　$[_{VP} [_{V}{}^1 [_{V}{}^0$ SEE $[_{NP}$ MOLLY] $[_{NP}$ YOU]]

　　　　b.　　(8)　$[_{AP} [_{A}{}^0$ BLUE $[_{NP}$ THE BOOK]]]

　　　　c.　　(9)　$[_{VP} [_{V}{}^1 [_{V}{}^0$ ROLL $[_{NP}$ THE BALL]] $[_{PP}$ AWAY]

We will deal with "away" later. In (45b) and (45c), the internal argument is targeted since there is no external argument. (45b) is shown in tree structure form:

(46)

$$
\begin{array}{l}
\text{TP/VP} \\
\quad \diagup \qquad \diagdown \\
\text{T}^0 \qquad\qquad \text{AP} \\
\begin{bmatrix} -\text{Past} \\ +\text{Host} \\ +\text{V, -N} \\ +\text{G} \end{bmatrix} \quad \begin{array}{l} \text{A}^0 \qquad\qquad \text{NP} \\ \text{BLUE} \qquad\quad \text{-Case\_Inh} \\ +\text{G} \qquad\qquad \text{THE BOOK} \end{array}
\end{array}
$$

Adjectives like nouns do not assign Case. The internal argument is targeted by Prom where the NP will be assigned the nominative Case. Since T needs a verbal host, [-Past] cannot be linked to A^0. The dummy verb BE must be inserted to function as a host for T^0.

　　　The above examples represent the most basic structure of argument assigning predicates in english, if not universally. The complement of the predicate is a First Level complement. The default for verbal first level complements is a theme. In non-default predicates other theta-roles may occur in this position. In these cases, the predicates must somehow be marked.

8.2　Locative

　　　Location is a theta role that marks the stationary position of an object in respect to some other object:

(47)   a.   (11)   The book is on the table.

         b.   (12)   Tilly's car is in the garage.

         c.   (13)   The sun lies within the earth's orbit.

In (64) the table is a location; the book is a theme. Location is often headed by a preposition; that is, it is an argument of the verb. However, location can be an argument of a verb:

(48)   a.   (14)   The punch is in the punchbowl.

         b.   (15)   The punchbowl contains the punch.

The near synonymy of (48a) and b) provides evidence that punchbowl is a location in (48a), and that punch is a theme, just as in (48b).

Locative is assigned to the internal argument of P^0; the theme is assigned to the argument position which is a sister to P^1. The L-Structure of (48a) is given:

Here the first level argument is location. This makes sense as the preposition is pointing at a location. The theme is secondary to a locative preposition. Note that the preposition assigned [-Nom] to the first level complement, but not to the second level complement. It is targeted by Prom where it will be assigned [+Nom].

8.3   Goal, Source, Path--the second level

Verbs of motion often imply a location denoting goal, source, and path. The first three occur with events denoting a specific motion:

(49)   a.   John walked from school past the burning effigy to the library.

         b.   The ball rolled from the door down the hallway to the kitchen.

Let us illustrate with the worm. In the simplest scenario, the worm is the agent. No reference had been made to the wormhole. In the following sentence:

(50)   The worm moved through the wormhole.

The wormhole refers to the path of the movement of the worm. The wormhole bears the theta role path. Each end of the wormhole alternatively functions as a source or goal; simultaneously the other end has the oppose that role. For example, if end one is the goal, end two is the source, and vice versa. The worm just keeps moving. In the second case, there are two ends of the wormhole. The worm moves from one end to the other. Thus, one end is the source, and the other is the goal. Note that without tense, it would be impossible to determine which end is the goal and which is the source. Bring in the factor of tense, the source is the end in the past tense, and the goal is the end in the future:

(51)   The worm moved from one end (source) to the other end (goal).

When the first level complement is a theme, these three theta roles occur with a preposition. These theta roles occur in what we will call the second level. In the syntax there is no specific ordering of these three arguments:
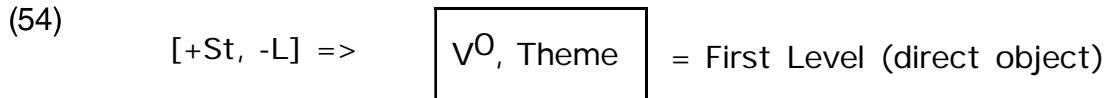
(52) a.   John walked from the store through the woods to school.

      b.   John walked from the store to school through the woods.

      c.   John walked to school from the store through the woods.

      d.   John walked to school through the woods from the store.

      e.   John walked through the woods to school from the store.

      f.   John walked through the woods from the store to school.

Since an adverb can occur after the internal argument (direct object) and after any of these PPs, a binary system must be maintained. The adverb is adjoined either to V^1, or to V^n, where 'n' is => than 1.
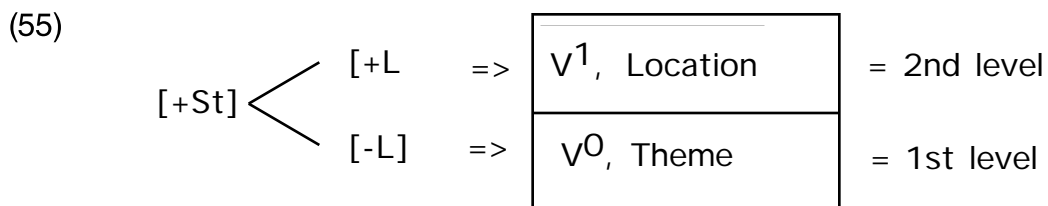
Let us look at locatives in the following way. First there are verbs and adjectives that denote a state but do no denote location:

(53) a.   The book is blue.

      b.   The sun is shining.

We do not perceive either the book or the sun as undergoing a change of state. Both are in a steady state. In the following diagram, the comma means sister of (V^0 and Theme are sisters):

(54)

$$[+St, -L] => \boxed{V^0, \text{ Theme}} = \text{First Level (direct object)}$$

Some verbs denote a location in a steady state. We mark location as [+L]. in the book is on the table:

(55)

$$[+St] \begin{cases} [+L] & => & \boxed{V^1, \text{ Location}} & = \text{2nd level} \\ [-L] & => & \boxed{V^0, \text{ Theme}} & = \text{1st level} \end{cases}$$
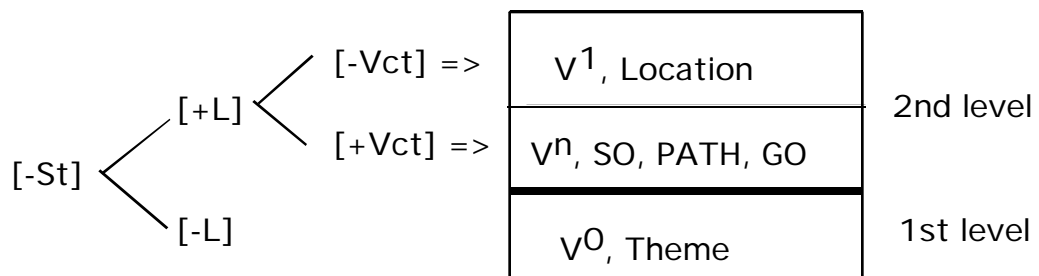
Here and in (54) [-L] refers to the non-locative part of the meaning of the verb--the theme. [+L], obviously, refers to the locative features of the verb. [-Vct] refers to the theme which does not denote location vector.

And some verbs denote a change in location of the theme:

(56)   Olaf swam from the dock past the buoy to the shore.

(57)

$$[-St] \begin{cases} [+L] \begin{cases} [-Vct] => & \boxed{\begin{matrix} V^1, \text{ Location} \\ V^n, \text{ SO, PATH, GO} \\ V^0, \text{ Theme} \end{matrix}} & \begin{matrix} \text{2nd level} \\ \\ \text{1st level} \end{matrix} \\ [+Vct] => \end{cases} \\ [-L] \end{cases}$$

Here, location ([+L]) refers to location in general, and it can be broken down into the three basic subunits of location: source, path, and goal, the vector arguments. We will insert into this level the vector arguments ([+Vct]. Verbs of motion are [-St]. The theme, [-L] is assigned to the first level (the direct object position). [+L] divides

26

into [±Vct] as shown above. We will return this below. Normally, the location vector arguments are optional in English verbs. Furthermore, there can be more than one PATH argument:

(58)   Olaf swam through the choppy water past the buoy along the shore to the dock.

Now consider the following sentence:

(59)   Olga put the cup on the table.

The preposition on normally marks location, but not goal. The preposition to marks goal:

(60)   a.   Olga pushed the cup to her brother.
        b.   Olga pushed the cup onto the table

In (60a) to marks the goal, but it does not specify location. In (60b) onto marks both location and goal. The compound preposition consists of two morphemes—on which marks location, and to which marks goal. Note that is onto replaces to in (60a), the result may seem semantically odd:

(61)   Olga pushed the cup onto her brother.

Here the interpretation is that the final location of the cup is on her brother. Referring to the model in (55) on is marking Location and to is marking goal. Marking both subcategories increases the complexity of the problem. In (59) location is marked but goal is not. Marking goal with put seems odd:

(62)   ?Olga put the cup onto the table.

It appears that put and its synonyms place and set restrict the second level argument to location only. Change of location is denoted by the these verbs, but the arguments marking source, path, and goal is unacceptable.

The distinction between goal and location is further noted in the following examples:
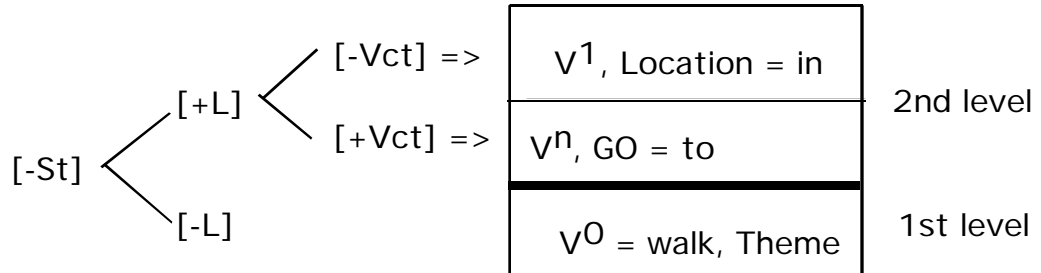
(63)   Sally walked into the room.

Here in clearly marks location but location is not marked in (64):

(64)   Sally walked to the room.

That Sally actually entered the room is not implied. location of Sally is not overt here. We suggest the following figure to illustrate the arguments and levels of (63):

(65)

$$
[\text{-St}] <
\begin{cases}
[\text{+L}] < \begin{cases} [\text{-Vct}] => \boxed{V^1, \text{Location} = \text{in}} \\ [\text{+Vct}] => \boxed{V^n, \text{GO} = \text{to}} \end{cases} \\
[\text{-L}] \quad \boxed{V^0 = \text{walk, Theme}}
\end{cases}
$$

V^1, Location = in	2nd level
V^n, GO = to	
V^0 = walk, Theme	1st level

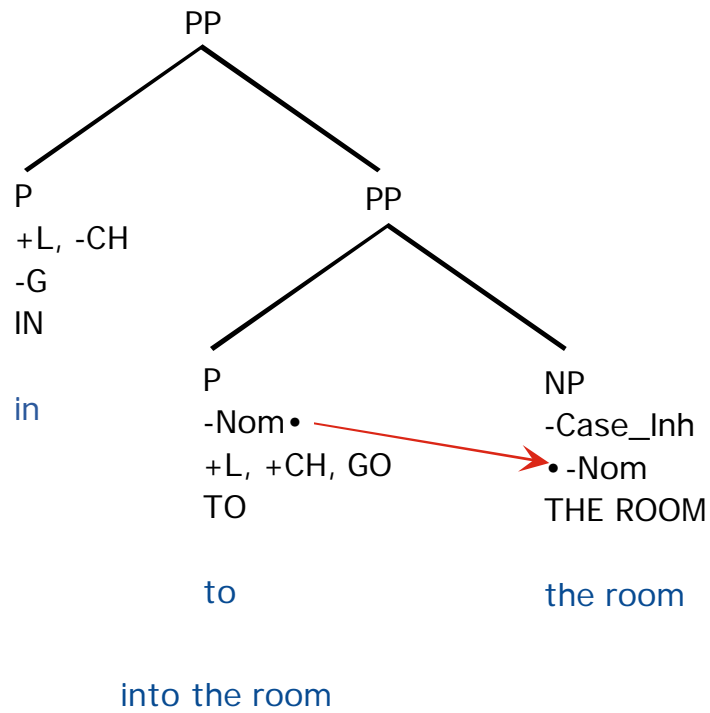Path is marked by several prepositions in English: through, up, down, over, under, next to, besides, around. Some of these prepositions also mark location: over, under, next to, besides, around.

The syntax does not treat the location-change arguments as another level. Change is seen as an argument of Location. In the case of into in is a locative argument of the verb, and to is an argument of the locative argument:

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(66)

```
                        PP
                       /  \
                      /    \
                     /      \
                    P        PP
                +L, -CH     /  \
                -G         /    \
                IN        /      \
                         P        NP
                in      -Nom•    -Case_Inh
                        +L, +CH, GO  •-Nom
                        TO        THE ROOM

                        to        the room
```

into the room

The phrase marker for is shown in (67). The feature [-L] corresponds to STATE here. STATE has no phonetic form and cannot assign Case nor can it govern:

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(67)

PromP

Prom⁰
Target
Int-Arg

THE
BOOK
-Case_Inh
• +Nom
-Pers
-Pl

the book

T⁰
-Past
+Host
+V, -N
+G
-Pers
-Pl

BE

is

TP/XP

X²=XP

X¹

X⁰
STATE
-G

[null]

NP
Int-Arg
Theme
[-Case_Inh
  +Nom]
BOOK
-Pers
-Pl

P¹=PP

P⁰
Location
ON
-Nom•

on

NP
-Case_Inh
• -Nom
THE TABLE

the table

[null]
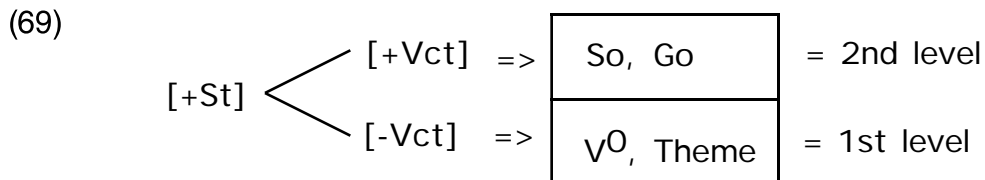
8.4   Change of State

In the above section we discussed the feature [+Ch] of location. The same feature may also apply directly to state where location is not a factor:

(68)   a.   Mary broke all the dishes into small pieces.

b.   The ice cream melted into a mushy mess.

c.   Joshua became a screaming fool.

d.   The meat loaf turned from a reddish colour to a dark brown as it cooked.

State is either [-Ch] as (43a) and similar examples, or it is [+Ch] which refers to the change of state of the theme. Let us start with (68d). The theme is the meat since that is what is being discussed. Two states are denoted—the source state from a reddish colour, and the goal state a dark brown. We can represent the arguments of [-L, +Vct] as:

(69)

$$[+St] \begin{cases} [+Vct] & => \boxed{\text{So, Go}} & = \text{2nd level} \\ [-Vct] & => \boxed{V^0, \text{ Theme}} & = \text{1st level} \end{cases}$$

Here, the change of state is assigned to the second level. There appears to be no path argument in change of state. If the theme is the direct object, it must immediately follow the verb; the second level arguments are not so restricted:

(70) a. The heat of the oven turned the meat loaf from a reddish colour to a dark brown.

   b. *The heat of the oven turned from a a reddish colour the meat loaf to a dark brown.

   c. *The heat of the oven turned from a a reddish colour to a dark brown meat loaf.

In (68b) ice cream is the theme and it could also be considered the source in that the source state is called ice cream, but after it has melted it is much less likely to be called ice cream. In such cases as this the theme remains marked at the first level, and the source is not marked as it is understood pragmatically to be the source. The same is true for (68a) and (68c).

8.5   Experiencer

In the following sentence, John is the argument of die. John is a participant; he is the one who dies. If one undergoes an experience denoted by the verb, the theta-role is called an experiencer:

(71)   John died.

Here, John has experienced death. We may represent this argument in propositional form:

(72)   [TENSE [+Past] < DIE <experiencer: JOHN>>].

If there is no theme as in (71) directly above the experiencer is assigned to the internal argument position. If there is a theme, by the default rule, the theme occurs in the internal argument position and the experiencer occurs in the external argument position:
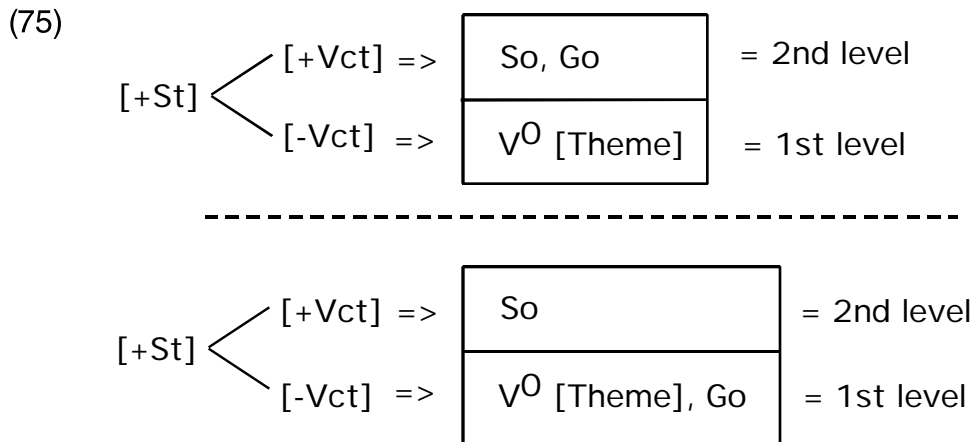
(73)   John likes Mary.

"John" is the experiencer. "Mary" may or may not be the theme, depending on one's analysis of theta-roles. Let "Mary" be the theme for the time being.In the active voice the external argument is targeted, and in the passive voice the internal argument is targeted:

(74)   Mary is liked by John.

In the semantically close AP "be pleased", the theme is targeted for prominence, while the experiencer occupies the goal position (see below).
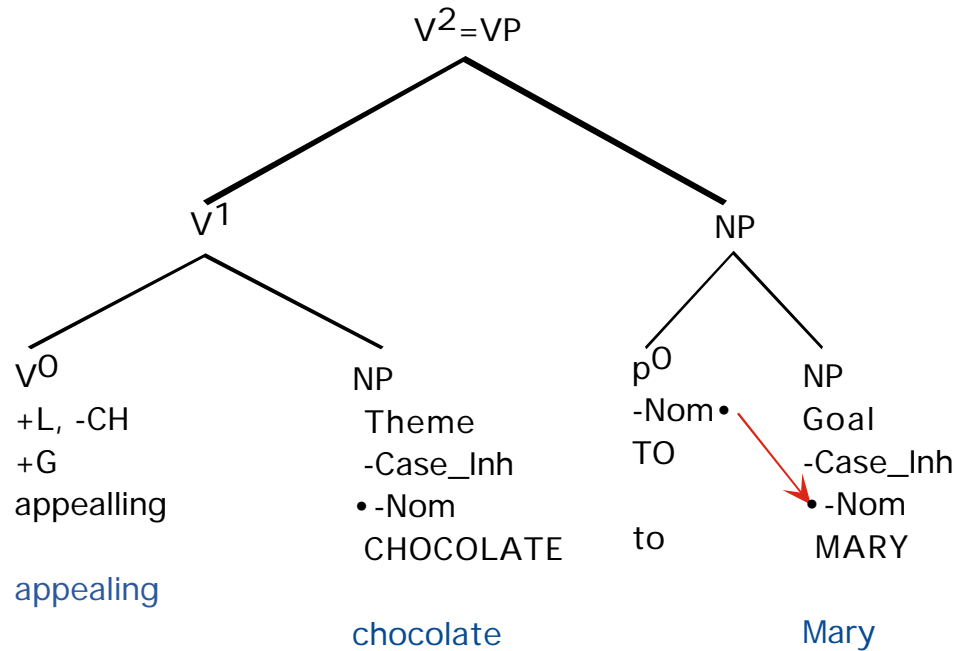
Let us look at (73) in more detail. John is the experiencer of the state. It is possible to consider John a goal and Mary a source. There is something about Mary that in some abstract sense goes from Mary to John. Verbs of the class including like do not represent a change, such verbs are states. Yet the idea of a goal and source persists. We call the class of arguments containing a goal, path, or source a vector, since this term does not imply a change of state in any way. The reverse is not necessarily true and is definitely not implied—Mary could detest John. Neither is a theme if this view is correct. What is the theme if there is indeed a theme? This is an interesting question. Semantically, it could be transition of John's perception. It is not represented in the syntax:

(75)

$$
[+\text{St}]
\begin{cases}
[+\text{Vct}] => & \boxed{\text{So, Go}} & = \text{2nd level} \\
[-\text{Vct}] => & \boxed{V^0 \text{ [Theme]}} & = \text{1st level}
\end{cases}
$$

- -

$$
[+\text{St}]
\begin{cases}
[+\text{Vct}] => & \boxed{\text{So}} & = \text{2nd level} \\
[-\text{Vct}] => & \boxed{V^0 \text{ [Theme], Go}} & = \text{1st level}
\end{cases}
$$

The upper figure in (75) represents the default of cognitive lexical items. The theme is incorporated in the verb, which is marked by enclosing square brackets around Theme. In the syntax there is no argument in the 1st level position (direct object). Although it is not required that there be an argument in that position, cognitive predicates usually assign an argument there. The default argument appears to be the goal, as indicated in the lower figure in (75). In non-default cases, the source is assigned to that position.

In cases such as this, one of the semantic level two arguments must be assigned to the direct object position. In the case of like, the source is assigned to the direct object. What about the goal? In logical structure it appears that it is an NP. The NP needs Case and is targeted by Prom. Hence, it spelled out at the tail end of the link. The structure of the VP containing both arguments is the following:

(76)

V²=VP

V¹

NP

V⁰
+L, -CH
+G
appealling

appealing

NP
Theme
-Case_Inh
•-Nom
CHOCOLATE

chocolate

p⁰
-Nom•
TO

to

NP
Goal
-Case_Inh
•-Nom
MARY

Mary

The one odd thing is finding an NP in the second level rather a PP which is the default by a large margin. This is the only option if the goal (experiencer) is to be marked prominent. In the following sentence:
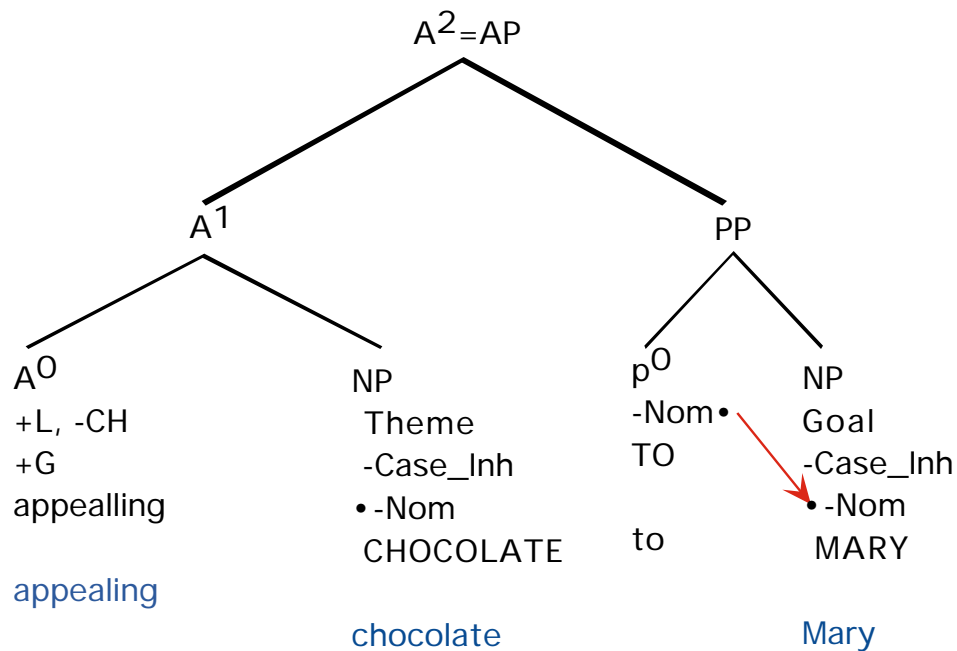
(77)   Sweet chocolate is appealing to Mary.

Mary is the goal and it occurs as a PP, which means that it cannot be targeted for prominence:

(78)   a.   *Mary is being appealing chocolate to.
        b.   *To Mary is being appealing chocolate.

PPs cannot occur in the subject position (prom) in English. The theta-roles are reversed:

34

(79)

$$A^2=AP$$

```
                    A²=AP
                   /        \
                  /          \
                A¹            PP
              /    \         /   \
            A⁰      NP      p⁰     NP
          +L, -CH  Theme   -Nom•   Goal
          +G      -Case_Inh  TO    -Case_Inh
        appealling •-Nom          •-Nom
                  CHOCOLATE  to    MARY
          appealing
                  chocolate        Mary
```

Experiencers also show up in cognitive verbs:

(80)   a.   John knows everything about linguistics.

       b.   Mary remembered to go to her semantics class.

9   Secondary Complements

A secondary complement is one which is an argument of a feature which has been adjoined (in the lexicon) to an underlying verb. Two examples of secondary complements include agents and instruments.
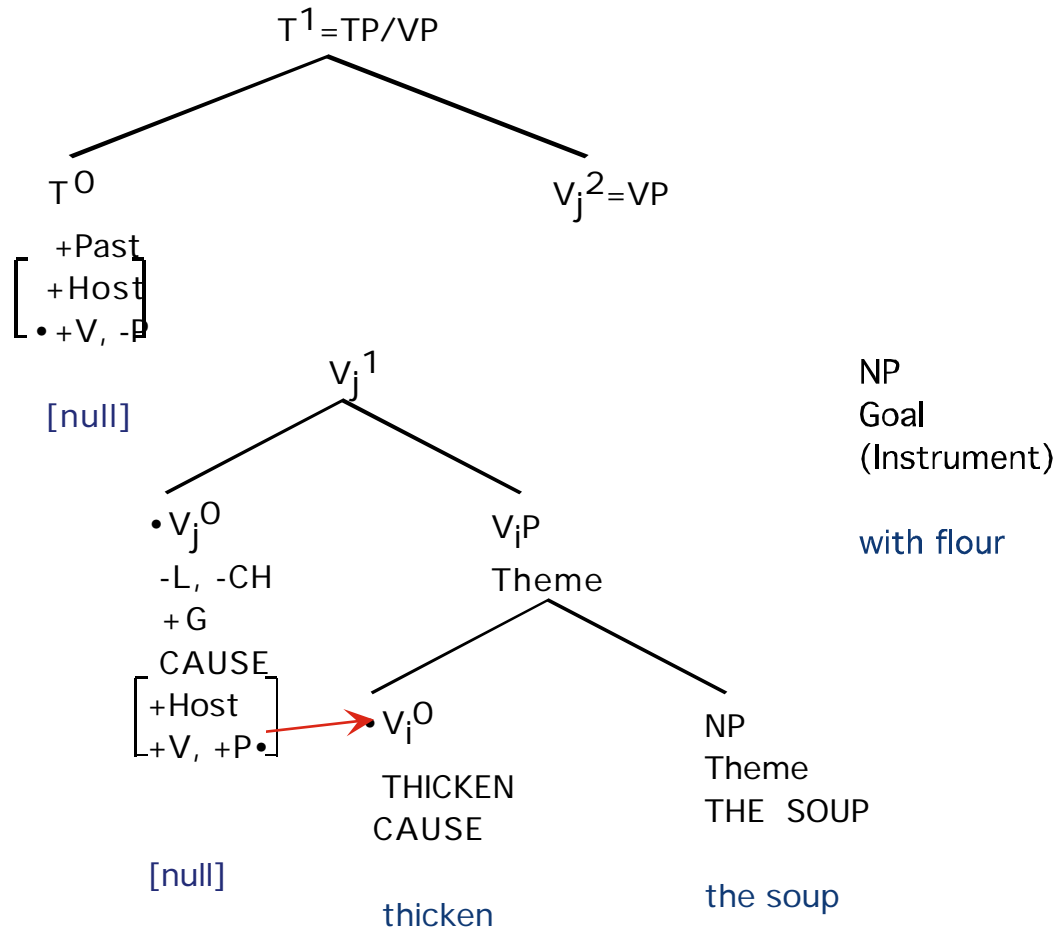
9.1   Instrument

The instrument is the argument that directly causes an event or action to happen. The instrument is distinct from the agent (see section 9.2 below).Consider the following sentence:
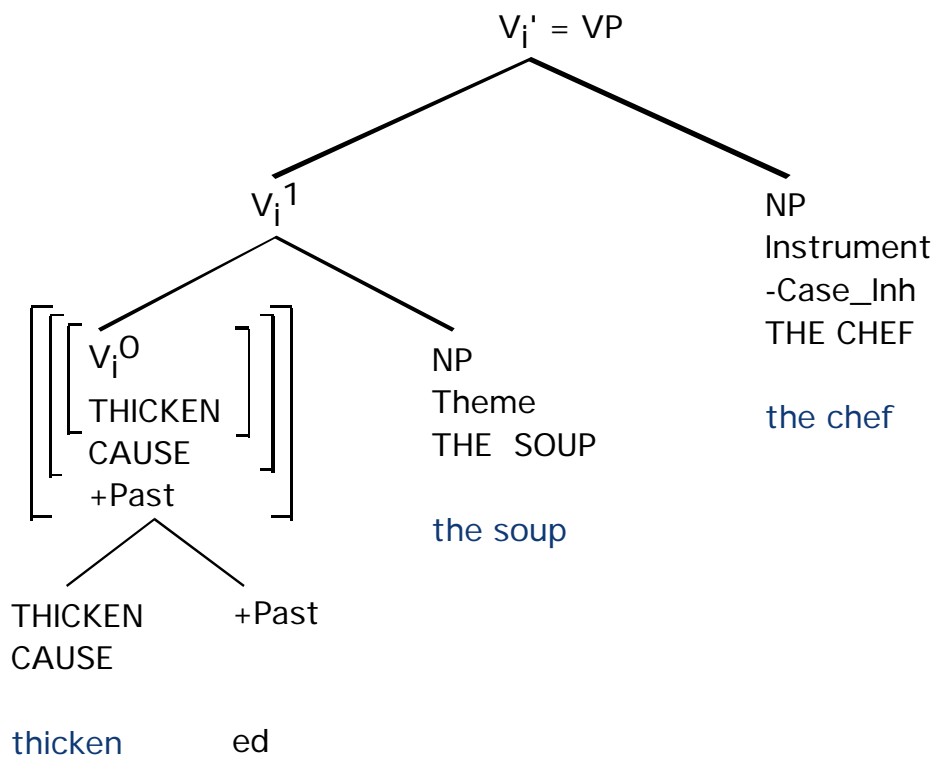
(81)   a.   John melted the ice-dream with a blow torch.

       b.   The young puppy scratched his fleas with his left hind foot.

       c.   The chef thickened the soup with flour.

In (81a) it is the blow torch (semantically, the hot flame that is emitted from the blow torch) that actually melting the ice cream--it is the instrument. John is the agent that controls the blow torch. In (81b) it is the puppy's left hind foot that is actually doing the scratching--it is the instrument. The young puppy is the agent that controls his left hind foot. In (81c) it is the flour that is actually thickening the soup:

(82)

T^1=TP/VP

T^0
+Past
+Host
• +V, -P

[null]

V_j^2=VP

V_j^1

•V_j^0
-L, -CH
+G
CAUSE
+Host
+V, +P•

[null]

V_iP
Theme

•V_i^0
THICKEN
CAUSE

thicken

NP
Theme
THE SOUP

the soup

NP
Goal
(Instrument)

with flour

[+Past] needs a verb as a host, and since it f-governs CAUSE, it is adjoined to CAUSE. CAUSE here needs a verbal host, and since it governs THICKEN, CAUSE and everything adjoined to it is copied and adjoined to THICKEN. Though a presyntactic operation called tree-pruning, the null nodes are eliminated, and the argument of CAUSE is projected as a secondary argument of THICKEN. Secondary arguments are arguments of a category that are not part of the integral meaning of the verb. The integral meaning of verb includes arguments of the first and second levels only:

(83)

$V_i' = VP$

V_i^1

NP
Instrument
-Case_Inh
THE CHEF

the chef

V_i^0

THICKEN
CAUSE
+Past

NP
Theme
THE SOUP

the soup

THICKEN   +Past
CAUSE

thicken   ed

The remnant node dominating V_i^2 is marked as V_i'. Since V_i' is now a projection of V_i^0, V_i'. is the maximal projection of V_i. If there is no agent, the instrument is the external argument and it is targeted as prominent by Prom in the active voice. In the passive voice,

(84)   The soup was thickened by the chef.

the theme is targeted by Prom. In order to receive Case, The dummy preposition with is inserted. The dummy projection for secondary complements is with. More evidence of this is given in the following subsection.

9.2   Agent

If the participant is causing something to happen or is in some way responsible for something happening or has conscious control over something happening, the participant is called an agent. In the wormhole view the agent is the IPU which sends out messages to other organs to complete some feat:

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(85) a.   Bill is building a house.

b.   Mary bought a beat up car.

c.   The dog is running away.

The subject in each of these sentences is an agent. The progressive aspect is not represented in the following grammatical propositional forms:

(86) a.   [TENSE [-Past] < BUILD <goal: HOUSE> <agent: BILL> >].

b.   [TENSE [+Past] < BUY <theme: CAR> <agent: MARY> >].

c.   [TENSE [-Past] < RUN <agent: DOG> <source: AWAY> >].

We claim here that an agent deals with the submission of information. The agent sends out information to a certain form that is responsible for causing an event to occur. The immediate source of this information we will call an Information Processing Unit (IPU). We will look at three different scenarios.
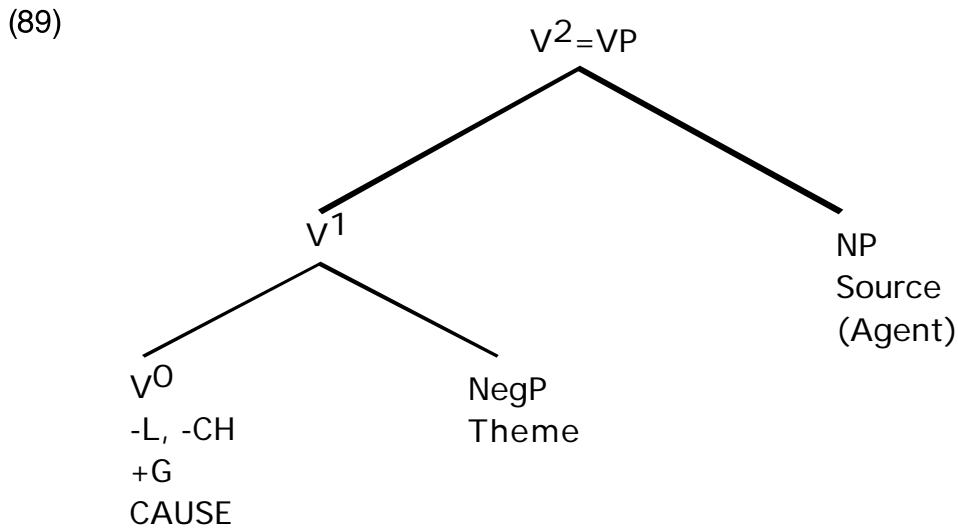
In all natural languages, the agent seems to be assigned to the external argument position without exception:

(87) $[_{VP} [_V^1 [_V^0 \text{BUILD}] [_{NP} \text{HOUSE}]] [_{NP} \text{JOHN}]]$.

The agent is associated with the lexical feature CAUSE. CAUSE takes two arguments. The level 1 argument is a theme whose semantic role is an event:

(88)   [[[CAUSE] [EVENT]] [AGENT]

In the syntax EVENT is realized as the theta role theme:

(89)

$V^2 = VP$

V^1

NP
Source
(Agent)

V^0
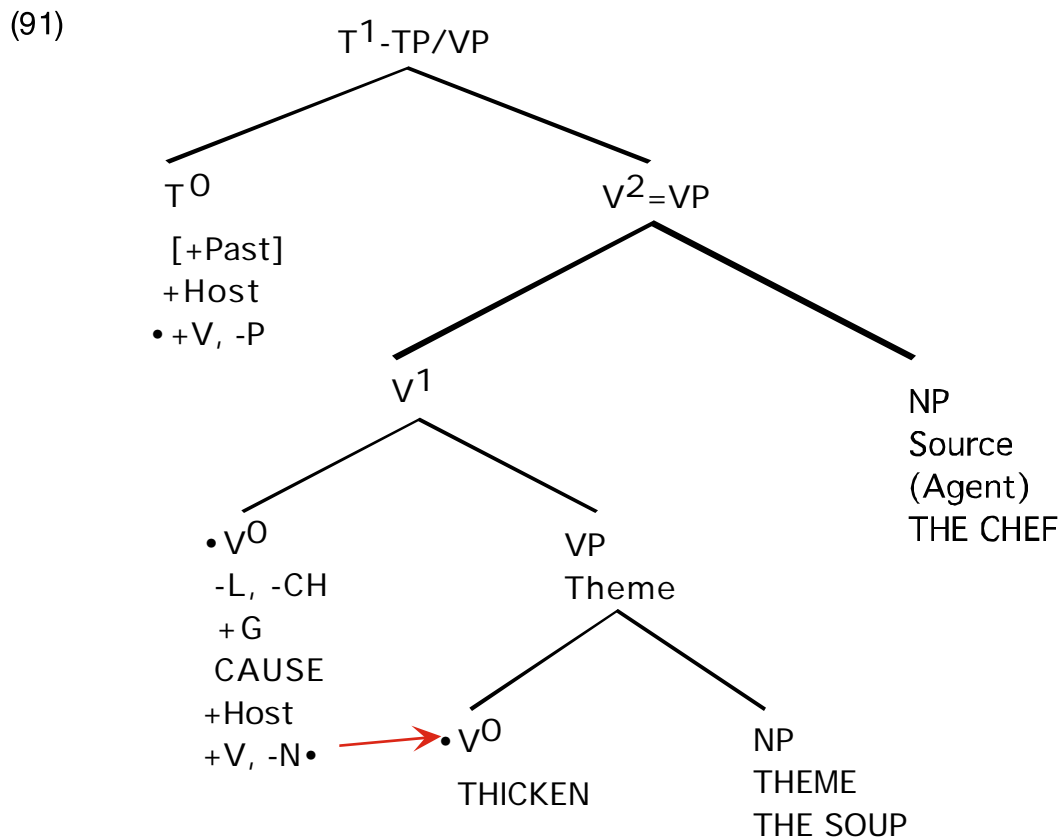-L, -CH
+G
CAUSE

NegP
Theme

Note that we consider the agent to be a source. We explain this in the wormhole example below. However, we will continue to use the term agent unless we are writing in theoretical terms. Agent then is defined as the source argument of CAUSE.

The theme (EVENT) in (89) is a infinitival clause (NegP). However, the is an alternate construction. Compare (90a) and (90b):

(90) a.   The chef caused the soup to thicken.
       b.   The chef thickened the soup.

In (90a) the EVENT is distinct from CAUSE; in (90b) CAUSE has been incorporated into the verb thicken as in the example with an instrument. That is, THICK targets V and is adjoined to it. The chef in both examples is the agent argument of THICK. And the soup is the Theme associated with THICK in both examples. The difference is that in (90b) thicken is seen as referring to a single EVENT. Time adverbs refer to THICK rather than CAUSE.

We do not consider the targeting of CAUSE to THICK to be a syntactic operation, but a presyntactic one. We will not go into this distinction here. The derivation of VP in (90b) from CAUSE in (90a) is the following:

(91)

T^1-TP/VP

T^0
[+Past]
+Host
• +V, -P

V^2=VP

V^1

• V^0
-L, -CH
+G
CAUSE
+Host
+V, -N• → • V^0

THICKEN

VP
Theme

NP
THEME
THE SOUP

NP
Source
(Agent)
THE CHEF

The derivation to the surface structure is similar to the derivation with the instrument. In the passive voice, the dummy verb by is inserted:

(92)   The souped was thickened by the chef.

9.3   Agent and Instrument

Both the agent and the instrument may occur with thicken and similar verbs (of which there are many):

(93)   a.   The chef thickened the soup with flour.

       b.   The soup was thickened with flour by the chef.

It now appears that CAUSE takes one level one argument--the theme--and two level two arguments--the agent and the theme. In the following section we show that agent is essen-
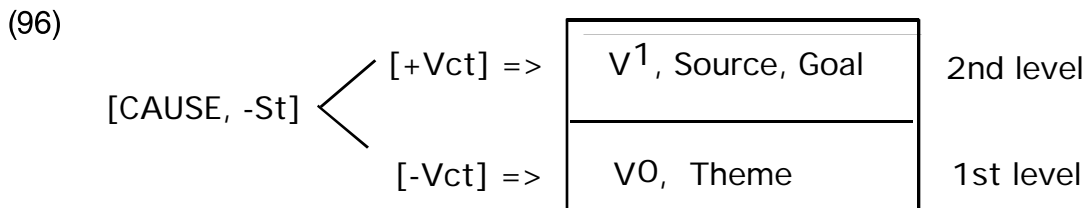
40

tially a source (information coming from the IPU). It seems reasonable to consider the instrument a goal: the information is sent to the instrument. Semantically, the instrument is a goal in a message is sent to it to do something:

(94)   John kicked the door in with his left foot.

The instrument here is his left foot. John's brain sent a message to his left foot to kick in the door. Not all instruments are semantic goals, but another class of them are associated with a goal:

(95)   Mary chopped the wood up with an ax.

Here, an ax is the instrument, but Mary cannot send a message to an ax. She sends a message to her hands and arms to use the ax to chop up the wood. The ax is associated with the hands and arms which are semantic goals. In (95) an ax fills the instrument slot, but is still semantically connected to the goal. In this way we can consider the instrument a goal.
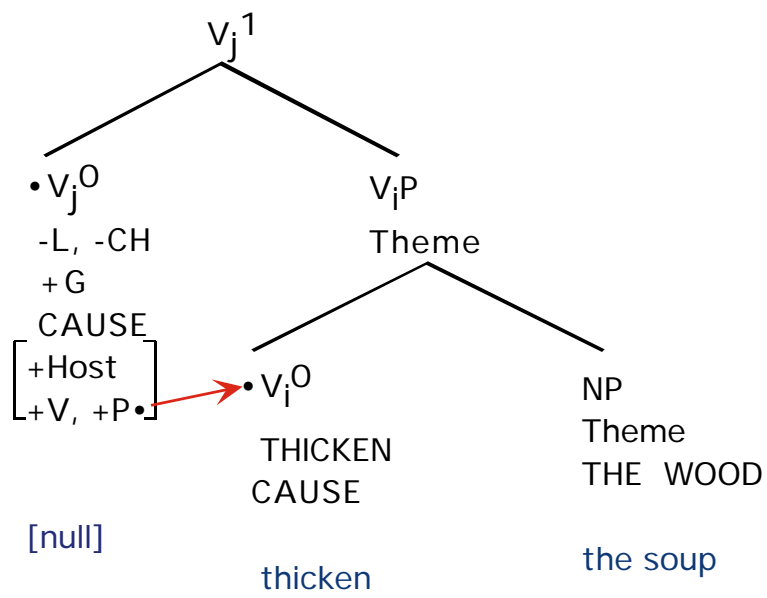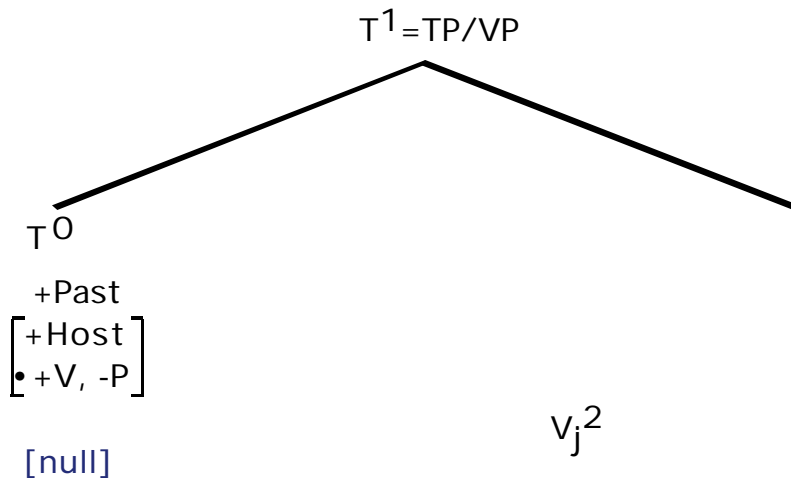
(96)

$$\text{[CAUSE, -St]} < \begin{array}{ll} \text{[+Vct] =>} & \boxed{V^1\text{, Source, Goal}} \quad \text{2nd level} \\ \text{[-Vct] =>} & \boxed{V^0\text{, Theme}} \quad \text{1st level} \end{array}$$

Unlike location, the arguments of CAUSE are ordered. The source (agent) is external to the goal (instrument):[1]

(97) a.   The wood was chopped up with an ax by Mary.
      b.   ?*The woods was chopped by mary with an ax.

The phrase structure for (95) is the following:

---

[1] If with an ax is in contrast with another PP, this ordering is possible. It is derived by a transformational rule called Extraposition.

(98)

T^1=TP/VP

T^0

+Past
$\begin{bmatrix} +\text{Host} \\ \bullet +V, -P \end{bmatrix}$

[null]

V$_j$^{2}

V$_j$^{1}

$\bullet$V$_j$^{0}

-L, -CH
+G
CAUSE
$\begin{bmatrix} +\text{Host} \\ +V, +P\bullet \end{bmatrix}$

[null]

V$_i$P
Theme

$\bullet$V$_i$^{0}

THICKEN
CAUSE

thicken

NP
Theme
THE WOOD

the soup

This page last updated 31 MR 2002