The Universal Networking Language (UNL)

Specifications

Version 3 Edition 3

UNL Center
UNDL Foundation
December 2004

Introduction

The UNL is an acronym for "Universal Networking Language". It is a computer language that enables computers to process information and knowledge across the language barriers. It is an artificial language that replicates, in the cyber world, the functions of natural languages in human communication. As a result, it enables people to express all knowledge conveyed by natural languages. It also enables computer to intercommunicate, thus providing people with a linguistic infrastructure for distributing, receiving and understanding multilingual information.

The UNL expresses information or knowledge in the form of semantic network with hyper-node. Different from natural languages, UNL expressions are unambiguous. In the UNL semantic network, nodes represent concepts, and arcs represent relations between concepts. Concepts can be annotated.

Since the UNL is a language for computers, it has all the components of a natural language. It is composed of words expressing concepts called "Universal Words", also referred to as UWs which are inter-linked with other UWs to form sentences. These links, known as "relations", specify role of each word in a sentence. The subjective meaning intended by the speaker can be expressed through "attributes".

The "Knowledge Base (UNLKB)" is provided to define semantics of UWs. The UNLKB defines every possible relation between concepts including hierarchical relations and inference mechanism based on inclusion relations between concepts. Thus, the UNLKB provides semantic background of the UNL to make sure the meaning of the UNL expressions is unambiguous.

UNL Specifications consists of the following items:

Chapter 1: UNL Expression

The UNL expresses information or knowledge in the form of semantic network with hyper-node. UNL semantic network is made up of a set of binary relations, each binary relation is composed of a relation and two UWs that hold the relation.

Expression of Binary Relation

A binary relation of UNL is expressed in the following format:

<relation> (<uw1>, <uw2>)

In <relation>, one of the relations defined in the UNL Specifications is described. In <uw1> and <uw2>, the two UWs that hold the relation given at <relation> are described. Such a binary relation is interpreted as follows:

Interpretation of Binary Relation

The semantic network of UNL expression is a directed graph by means of the binary relations. The three elements of each binary relation have the following interrelationship:

<uw1> --- <relation> --> <uw2>

This interrelationship means that the UW given in <uw2>

- plays the role indicated by the relation given in <relation> and held by the UW given in <uw1>;

whereas the UW given in <uw1>

- holds the relation given in <relation> with the UW given in <uw2>.

As mentioned above, all binary relations that compose a UNL expression has directions, and the semantic network of UNL expression is a directed graph.

Hyper-graph

The UNL expression is a hyper semantic network. That is, each node of the graph, <uw1> and <uw2> of a binary relation, can be replaced with a semantic network. Such a node consists of a semantic network of a UNL expression and is called a “scope”. A scope can be connected with other UWs or scopes. The UNL expressions of in a scope is distinguished from others by assigning an ID to the <relations> of the set of binary relations that belong to the scope. The general description format of binary relations for a hyper-node of UNL expression is the following:

<relation>:<scope-id> (<node1>, <node2>)

Where,

- <scope-id> is the ID for distinguishing a scope. <scope-id> is not necessary to specify when a binary relation does not belong to any scope.
- <node1> and <node2> can be a UW or a <scope node>.
- A <scope node> is given in the format of “:<scope-id>”.

For details of the UNL expression description format please refer to “Chapter 5 Format of UNL Expression”.

Chapter 2: Relations

There are many factors to be considered in choosing an inventory of relations between concepts. Different factors taken into account in choosing the relations lead to different sets of the relations. The UNL relations are selected according to the following principles.

Principles of Relation

PRINCIPLE 1 : NECESSARY CONDITION
When an UW has relations between more than one other UWs, each relation label should be set so as to be able to identify each relation on the premise that there is enough knowledge about the concept of each UW expressed.

PRINCIPLE 2 : SUFFICIENT CONDITION
When there are relations between UWs, each relation label should be set so as to be able to understand the role of each UW only by referring to the relation label.

Definitions of Relations

The following are the relations defined according to the above principles. A relation label is represented as strings of 3 characters or less

agt (agent)

Agt defines a thing that initiates an action.

agt (do, thing)
agt (action, thing)

Syntax
agt [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed Definition
An agent is defined as the relation between:
UW1 - do, and
UW2 - a thing
where:
- UW2 initiates UW1, or
- UW2 is thought of as having a direct role in making UW1 happen.

Examples and readings

agt (break(agt>thing,obj>thing), John(iof>person))	John breaks …
agt (translate(agt>thing,gol>language,obj>information,src>language), computer(icl>machine))	computer translates …
agt (run(icl>act(agt>volitional thing)), car(icl>vehicle))	car runs …
agt (destroy(agt>thing,obj>thing), explosion(icl>event))	explosion destroys …

Related Relations
- An agent is different from **cag** in that an agent initiates the action, whereas a co-agent initiates a different, accompanied action.
- An agent is different from **ptn** in that an agent is the focused initiator of the action, whereas a partner is a non-focused initiator.
- An agent is different from **aoj** in that an agent initiates an action, whereas **aoj** (a thing with attribute) indicates a thing that is in a state. A state is expressed by a UW that belongs to 'be'.

and (conjunction)

And defines a conjunctive relation between concepts.

and (uw, uw)

Syntax
and [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition
A conjunction is defined as the relation between:
UW1 – a concept, and
UW2 – another concept,
where:
- The UWs are different, and
- UW1 and UW2 are seen as grouped together, and
- what is said of UW1 is also said of UW2.

Examples and readings

and (quickly, easily)	… easily and quickly
and (dance(agt>person), sing(agt>person))	… singing and dancing
and (Mary(iof>person), John(iof>person))	… John and Mary

Related Relations
- A conjunction is different from **or** in that with **and** things are grouped together to say the same thing about both of them, whereas with **or** we separate them to indicate that what is true about one is not true about the other.
- A conjunction is different from **cag** in that when the agents are conjoined, both initiate an explicit event, whereas with **cag**, the co-agent initiates an implicit event.
- A conjunction is different from **ptn** in that when the agents and partners are conjoined, both are in focus, whereas with **ptn**, the partner is not in focus (as compared to the agent).
- A conjunction is different from **coo** and **seq** in meaning, although in many cases the same expressions can be used for both. A conjunction only means that terms are grouped together; no information about time is implied. **Coo**, on the other hand, means that the terms are in the same time, whether they are considered to be grouped together or not. In turn, **seq** means that the terms are ordered in time, one after the other.

aoj (thing with attribute)

Aoj defines a thing that is in a state or has an attribute.

aoj (be, thing)
aoj (thing, thing)
aoj (uw(aoj>thing), thing)

Syntax
aoj [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition
A thing with an attribute or in a state is defined as the relation between:
UW1 – an attribute or a state or a thing which represents a state, and
UW2 – a thing,
where:
- UW1 is an attribute or state of UW2, or
- UW1 is a state associated with UW2.

Examples and readings

aoj (red(aoj>thing), leaf(pof>plant))	... leaf is red.
aoj (available(aoj>thing,obj<thing), information)	This information is available for …
aoj (nice, ski(agt>person))	Skiing is nice.
aoj (teacher(icl>occupation), John(iof>person))	John is a teacher.
aoj (have(aoj>thing,obj>thing), I)	I have a pen.

obj (have(aoj>thing,obj>thing), pen(icl>writing instrument))
aoj (know(aoj>thing,obj>thing), John(iof>person)) John knows …

Related Relations

- A thing with an attribute is different from **mod** in that **mod** gives some restriction of the concept in focus, whereas **aoj** indicates a thing of a state or characteristic.
- A thing with an attribute is different from **ben** in that a beneficiary is quite independent from a focused event or state. This event or state can be considered as exerting a good or bad influence on the beneficiary, whereas **aoj** indicates a thing that has a direct relation with the event or state, the event or state can be considered as describing a state or characteristic about the thing.
- A thing with an attribute is different from **obj** in that **obj** indicates a thing which is directly affected by an action or phenomenon, whereas, **aoj** indicates a thing in a state.

bas (standard (basis) of comparison)

Bas defines a thing used as the basis (standard) of comparison.

bas (be(aoj>volitional thing,bas>thing,obj>thing), thing)
bas (do(agt>thing,bas>thing,obj>thing), thing)
bas (how(bas>thing), thing)
bas (uw(aoj>thing,bas>thing), thing)

Syntax
bas [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition
A basis is defined as the relation between:
UW1 – a concept expressing comparison, and
UW2 – a thing,
where:

- UW1 is a concept expressing comparison, and
- UW2 is something used as the basis for evaluating the characteristic or quantity of some other (focused) thing;

Examples and readings

bas (more(aoj>thing,bas>thing), 7)	Ten is three more than seven.
bas (more(icl>how,bas>thing), Jack(iof>person))	Betty weighs more than Jack (does).
man (beautiful, more(icl>how,bas>thing)) bas (more(icl>how,bas>thing), rose(icl>flower))	A tulip is more beautiful than a rose
aoj (:01, John(iof>person)) man:01 (quiet(aoj>thing), more(icl>how,bas>thing)) bas:01 (more(icl>how,bas>thing), shy(aoj>thing))	John is more quiet than shy.
bas (prefer(aoj>volitional thing,bas>uw,obj>uw), live(agt>person):02) plc (live(agt>person):02, city(icl>region))	Many people prefer living in the country to living in a city

ben (beneficiary)

Ben defines an indirectly related beneficiary or victim of an event or state.

ben (be, thing)
ben (do, thing)
ben (occur, thing)
ben (uw(aoj>thing), thing)

Syntax
ben [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed Definition
A beneficiary is defined as the relation between:
UW1 – an event or state, and
UW2 – a thing,
where:
• UW2 is thought of as being indirectly affected by UW1, as the beneficiary or victim.

Examples and readings

ben (give(agt>thing,gol>thing,obj>thing), country(icl>region))	To give one's life for one's country.
ben (good(aoj>thing), John(iof>person))	It is good for John to …

Related Relations
• A beneficiary is different from **aoj** in that **aoj** has a direct relation with the focused state or event and the focused state or event can be considered as describing the thing of **aoj**; Whereas a beneficiary is quite independent from a focused event or state, but this event or state can be considered as exerting a good or bad influence on the beneficiary.

cag (co-agent)

Cag defines a thing not in focus that initiates an implicit event that is done in parallel.

cag (do, thing)
cag (action, thing)

Syntax
cag [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed definition
A co-agent is defined as the relation between:
UW1 - an action, and
UW2 - a thing
where:
• There is an implicit action that is independent of, but accompanies, UW1, and
• UW2 is thought of as initiating the implicit action, and
• UW2 and the implicit action are seen as not being in focus (as compared to the agent's action).

Examples and readings

cag (walk(agt>volitional thing), John(iof>person))	To walk with John
cag (live(agt>volitional thing), aunt(icl>person))	To live with … aunt

Related relations
• A co-agent is different from **agt** in that differing independent actions occur for an agent and a co-agent. Moreover, an agent and its action are in focus, while a co-agent and its action are not in focus.
• A co-agent is different from the **ptn** in that the co-agent initiates an action that is independent of an agent's action, whereas a partner initiates the same action together with an agent.

cao (co-thing with attribute)

Cao defines a thing not in focus that is in a parallel state.

cao (be, thing)
cao (thing, thing)
cao (uw(aoj>thing), thing)

Syntax
cao [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed definition
A co-thing with an attribute is defined as the relation between:
UW1 – a state or a thing which represents a state, and
UW2 – a thing,
where:
• There is an implicit state that is independent of, but accompanies, UW1, and
• UW2 is associated with the implicit state.

Examples and readings

cao (exist(aoj>thing), you)	… be with you

Related relations
• A co-thing with an attribute is different from **aoj** in that there is a different, independent state for the thing with an attribute and a co-thing with an attribute, respectively.

cnt (content)

Cnt defines the content of a concept.

cnt (uw, uw)

Syntax
cnt [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed Definition
A content is defined as the relation between:
UW1 – a concept, and
UW2 – a concept,
where:
• UW2 is the content or explanation of UW1.

Examples and readings

cnt (Internet(icl>communication network),amalgamation(icl>harmony))	The Internet: an amalgamation
cnt (language generator, deconverter.@double_quote)	a language generator "deconverter"…
cnt (risk(icl>danger), :01)	the risk of losing money
obj:01 (lose(aoj>thing,obj>thing)@entry, money(icl>mark))	

cob (affected co-thing)

Cob defines a thing that is directly affected by an implicit event done in parallel or an implicit state in parallel.

cob (be, thing)
cob (do, thing)
cob (occur, thing)
cob (event, thing)cob (uw(aoj>thing,obj>thing), thing)

Syntax
cob [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed Definition
A "co-object" is defined as the relation between:
UW1 – an event or state, and
UW2 – a thing,
where:
• UW2 is thought of as directly affected by an implicit event done in parallel or an implicit state in parallel.

Examples and readings

cob (die(obj>living thing), Mary(iof>person))	… dead with Mary
obj (injure(icl>hurt(agt>thing,obj>living thing)), John(iof>person)) cob (injure(icl>hurt(agt>thing,obj>living thing)), friend(icl>comrade).@pl) pos (friend(icl>comrade).@pl, he)	John was injured in the accident with his friends

Related Relationss

• A co-object is different from **obj** in that the **obj** is in focus, whereas **cob** is related to a second, non-focused implicit event or state.

con (condition)

Con defines a non-focused event or state that conditions a focused event or state.

con (be, uw)
con (do, uw)
con (occur, uw)
con (uw(aoj>thing), uw)

Syntax

con [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed definition

A condition is defined as the relation between:
UW1 – an event or state, and
UW2 – an event or state,
where:
• UW1 is a focused event or state, whereas
• UW2 is a conditioning event or state, and
• UW2 is thought of as having an indirect or external role in making UW1 happen, that is, as some conditioning or inhibiting factor (real or hypothesized) that influences whether or when UW1 can happen.

Examples and readings

aoj:01 (tired(aoj>thing), you) con (go(icl>move(agt>thing,gol>place,src>place)), :01)	If you are tired, we will go straight home.

coo (co-occurrence)

Coo defines a co-occurrent event or state for a focused event or state.

coo (be, be)
coo (be, do)
coo (be, occur)
coo (be, thing)
coo (be, uw(aoj>thing))
coo (do, be)
coo (do, do)
coo (do, occur)
coo (do, thing)
coo (do, uw(aoj>thing))
coo (occur, be)
coo (occur, do)
coo (occur, occur)
coo (occur, thing)
coo (occur, uw(aoj>thing))
coo (thing, be)
coo (thing, do)

coo (thing, occur)
coo (thing, thing)
coo (thing, uw(aoj>thing))
coo (uw(aoj>thing), be)
coo (uw(aoj>thing), do)
coo (uw(aoj>thing), occur)
coo (uw(aoj>thing), thing)
coo (uw(aoj>thing), uw(aoj>thing))

Syntax
coo [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition
A co-occurrence is defined as the relation between:
UW1 – an event or state, and
UW2 – an event or state,
where:
- UW1 is a focused event or state, whereas
- UW2 is a co-occurrent event or state, and
- UW1 occurs or is true at the same time as UW2.

Examples and readings

coo (cry(icl>weep(agt>volitional thing)), run(icl>act(agt>volitional thing)))	… was crying while running
coo (red(aoj>thing), hot(aoj>thing))	… is red while … is hot

Related Relations
- A co-occurrence is different from **seq** in that **seq** describes events or states that do not occur at the same time, but one after the other, whereas **coo** describes events that occur simultaneously.
- A co-occurrence is different from **tim** in that **coo** relates the times of events or states with other events or states, whereas **tim** relates events or states directly with points or intervals of time.

dur (duration)

Dur defines a period of time during which an event occurs or a state exists.

dur (be, do)
dur (be, event(icl>abstract thing))
dur (be, occur)
dur (be, period(icl>time))
dur (be, state(icl>abstract thing))
dur (be, thing)
dur (be, uw(aoj>thing))
dur (do, do)
dur (do, event(icl>abstract thing))
dur (do, occur)
dur (do, period(icl>time))
dur (do, state(icl>abstract thing))
dur (do, thing)
dur (do, uw(aoj>thing))
dur (occur, do)
dur (occur, event(icl>abstract thing))
dur (occur, occur)
dur (occur, period(icl>time))
dur (occur, state(icl>abstract thing))
dur (occur, thing)
dur (occur, uw(aoj>thing))
dur (thing, do)
dur (thing, event(icl>abstract thing))

dur (thing, occur)
dur (thing, period(icl>time))
dur (thing, state(icl>abstract thing))
dur (thing, thing)
dur (thing, uw(aoj>thing))
dur (uw(aoj>thing), do)
dur (uw(aoj>thing), event(icl>abstract thing))
dur (uw(aoj>thing), occur)
dur (uw(aoj>thing), period(icl>time))
dur (uw(aoj>thing), state(icl>abstract thing))
dur (uw(aoj>thing), thing)
dur (uw(aoj>thing), uw(aoj>thing))

Syntax
dur [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition
A duration is defined as the relation between:
UW1 – an event or a state, and
UW2 – a period during which the event or state continues.

Examples and readings

dur (work(agt>person), hour(icl>period))	… work nine hours (a day)
qua (hour(icl>period), 9)	
dur (talk(icl>express(agt>thing,gol>person,obj>thing), meeting(icl>event))	… talk … during meeting
dur (come(icl>move(agt>thing,gol>place,src>place), absence(icl>state))	… come during (my) absence

equ (equivalent)

Equ defines an equivalent concept.

equ (uw, uw)

Syntax
equ [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed Definition
An equivalent concept is defined as the relation between:
UW1 – a concept, and
UW2 – a concept,
where:
- The UWs are different, and
- UW2 is an equivalent concept of UW1.

Examples and readings

equ (deconverter, language generator.@parenthesis)	the deconverter (a language generator)

fmt (range: from-to)

Fmt defines a range between two things.

fmt (thing, thing)

Syntax
fmt [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition
A range (from-to) is defined as the relation between:
UW1 – a range-initial thing, and
UW2 – a range-final thing,
where:
- The UWs are different, and
- UW2 describes the beginning of a range and UW1 describes the end.

Examples and readings

fmt (z(icl>letter), a(icl>letter))	the alphabets from a to z
fmt (New York(iof>city), Osaka(iof>city))	the distance from Osaka to New York
fmt (Friday(icl>day), Monday(icl>day))	the weekdays from Monday to Friday

Related Relations
- A range is different from **src** and **gol** in that for **src** and **gol** the initial and final states of certain **obj** are characterized with respect to some event, whereas **fmt** makes a similar characterization but without linking the endpoints of a range to some event.
- A range is different from **plf** and **plt** or **tmf** and **tmt** in that **fmt** defines endpoints of a range without reference to any sort of event, whereas **plf**, **plt**, **tmf** and **tmt** delimit events.

frm (origin)

Frm defines an initial state of a thing or a thing initially associated with the focused thing

frm (thing, thing)
frm (thing, uw(aoj>thing))

Syntax
frm [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed definition
An origin is defined as the relation between:
UW1 – a thing, and
UW2 – a state or a thing than can be seen as origin of the thing,
where:
- The UWs are different, and
- UW1 is the focused thing, and
- UW2 is the initial state describing the focused thing UW1, or
- UW2 is a thing that is initially associated with the UW1, origin such as the original position of UW1.

Examples and readings

frm (visitor(icl>person), Japan(iof>country))	a visitor from Japan

Related Relations
- An origin is different from **src** in that **src** is a relation used with an event or a state, whereas **frm** is directly linked to a thing. For instance, "a visitor from Japan" is expressed as "**frm** (visitor(icl>person), Japan(iof>country))", whereas "a visitor came from Japan" is expressed as "**src** (come(agt>thing), Japan(iof>country))" and "agt (come(agt>thing), visitor(icl>person))".

gol (goal: final state)

Gol defines a final state of object or a thing finally associated with the object of an event.

gol (be(aoj>thing,gol>thing), thing)
gol (do, thing)
gol (do, uw(aoj>thing))
gol (occur, thing)

gol (occur, uw(aoj>thing))
gol (event, thing)

Syntax
gol [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition
A final state is defined as the relation between:
UW1 – an event, and
UW2 – a state or thing,
where:
- UW2 is the specific state describing the **obj** (of UW1) at the end of UW1, or
- UW2 is a thing that is associated with the **obj** (of UW1) and the end of UW1.

Examples and readings

gol (change(gol>thing,obj>thing,src>thing), red(aoj>thing))	the lights changed from green to red
gol (deposit(agt>thing,gol>thing,obj>thing), account(icl>record))	millions were deposited in a Swiss bank account

Related Relations
- A final state is different from **tmf** and **plf** in that **gol** describes qualitative characteristics and not time nor place related to an event.

icl (included/a kind of)

Icl defines an upper concept or a more general concept.

icl (uw, uw)

Syntax
icl [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed Definition
An upper concept or a more general concept is defined as the relation between:
UW1 – a class concept, and
UW2 – a class concept,
where:
- The UWs are different, and
- UW2 is an upper or more general class concept of UW1, i.e.
- UW1 is a subset concept of UW2, and UW1 inherits UW2’s property.

Examples and readings

icl (bird(icl>animal), animal(icl>living thing))	a bird is a (kind of) animal

ins (instrument)

Ins defines an instrument to carry out an event.

ins (do, concrete thing)

Syntax
ins [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition
An instrument is defined as the relation between:
UW1 – an event, and
UW2 – a concrete thing,
where:

• UW2 specifies the concrete thing that is used in order to make UW1 happen.

Examples and readings

ins (look(agt>thing,obj>thing), telescope(icl>optical instrument))	look at stars through [with] a telescope
ins (write(agt>thing,obj>thing), pencil(icl>stationery))	write [draw] with a pencil
ins (cut(agt>thing,obj>thing,opl>thing), scissors(icl>cutley))	He cut the string with a pair of scissors

Related Relations

• An instrument is different from **man** in that **man** describes an event as a whole, whereas **ins** characterizes one of the components of the event: the use of the instrument. And, a manner is an abstract thing whereas an instrument is a concrete thing.

• An instrument is different from **met** in that **met** is used for abstract things (abstract means or methods), whereas “ins” is used for concrete things.

iof (an instance of)

Iof defines a class concept that an instance belongs to.

iof (uw, uw)

Syntax

iof [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed Definition

A class concept is defined as the relation between:
UW1 – an instance, and
UW2 – a class concept,
where:
• The UWs are different, and
• UW2 is a class concept that UW1 belongs to, i.e.
• UW1 is an instance of UW2, and UW1 inherits UW2’s property.

Examples and readings

iof (Tokyo(iof>city), city in Japan)	Tokyo is a city in Japan

man (manner)

Man defines a way to carry out an event or the characteristics of a state.

man (be, how)
man (do, how)
man (occur, how)
man (uw(aoj>thing), how)

Syntax

man [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition

A “manner” is defined as the relation between:
UW1 – an event or state, and
UW2 – a manner,
where:
• UW1 is done or exists in a way characterized by UW2.

Examples and readings

man (move(agt<thing,gol>place,src>place), quickly)	move quickly
man (visit(agt>thing,obj>thing), often)	I often visit him.

man (beautiful, very(icl>how)) it is very beautiful.

Related Relations

• A manner is different from **ins** or **met** in that **ins** describes how an event is carried out in terms of the instruments, **met** describes how an event is carried out in terms of the component steps of the event, whereas **man** describes other quantitative or qualitative characteristics of the event as a whole.

met (method or means)

Met defines a means to carry out an event.

met (do, abstract thing)
met (do, do)

Syntax

met [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition

A “method or means” is defined as the relation between:
UW1 – an action, and
UW2 – an abstract thing or an action,
where:
• UW2 specifies the abstract thing used or the steps carried out in order to make UW1 happen.

Examples and readings

met (solve(icl>resolve(agt>thing,obj>thing)), dynamics(icl>science))	… solve … with dynamics
met (solve(icl> resolve(agt>thing,obj>thing)), algorithm(icl>method))	… solve … using … algorithm
met (separate(agt>thing,obj>thing,src>thing)), cut(agt>thing,obj>thing,opl>thing))	… separate … by cutting …

Related Relations

• A method or means is different from **man** in that **man** describes an event as a whole, whereas **met** characterizes the component steps or procedures of an action.
• A method or means is different from **ins** in that **met** is used for abstract things (abstract means or methods), whereas **ins** is used for concrete things.

mod (modification)

Mod defines a thing that restricts a focused thing.

mod (thing, thing)
mod (thing, uw(mod<thing))

Syntax

mod [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition

A “modification” is defined as the relation between:
UW1 – a thing, and
UW2 – a restriction or a thing,
where:
• UW1 is the focused thing to be restricted by UW2, and
• UW2 is a restriction or a thing that restricts UW1 in some way.
• When UW2 is a set of UNL expressions of a clause or an phrase, this phrase or clause must be the concrete content of UW1. In this case the whole UNL expression of the phrase or clause must be expressed in a scope and will be treated as a NOMINAL concept.

Examples and readings

mod (story(icl>tale), whole(mod<thing))	the whole story
mod (plan(icl>idea), master(mod<thing))	a master plan
mod (part(pof>thing), main(mod<thing))	the main part

Related Relations

• A modification is different from **aoj** in that **aoj** indicates a thing that is in a state or has some characteristic, whereas **mod** merely indicates a restriction of the focused thing, which might indirectly suggest some characteristics of the thing described.

• A modification is different from **man** in that **man** describes a way to carry out an event or the characteristics of a state, whereas **mod** restricts a thing.

nam (name)

Nam defines a name of a thing.

nam (thing, thing)

Syntax

nam [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed definition

A name is defined as the relation between:
UW1 – a thing, and
UW2 – a thing used as a name,
where:
• The UWs are different, and
• UW2 is a name of UW1.

Examples and readings

nam (tower(icl>building), Tokyo(iof>city))	Tokyo tower

obj (affected thing)

Obj defines a thing in focus that is directly affected by an event or state.

obj (be, thing)
obj (do, thing)
obj (occur, thing)
obj (uw(aoj>thing,obj>thing), thing)

Syntax

obj [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed Definition

An affected thing is defined as the relation between:
UW1 – an event or state, and
UW2 – a thing,
where:
• UW2 is thought of as directly affected by an event or state.

Examples and readings

obj (move(gol>place,obj>thing,src>place), table(icl>furniture))	the table moved.
obj (melt(gol>thing,obj>thing), sugar(icl>seasoning))	the sugar melts into …
obj (cure(agt>thing,obj>thing), patient(icl>person))	to cure the patient.
obj (have(aoj>thing,obj>thing), pen(icl>writing instrument))	I have a pen.

Related Relations

• An affected thing is different from **cob** in that **obj** is in focus, whereas **cob** is related to a second, non-focused implicit event or state.

opl (affected place)

Opl defines a place in focus affected by an event.

opl (do(agt>thing,obj>thing,opl>thing), thing)
opl (occur(obj>thing,opl>thing), thing)

Syntax

opl [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed Definition

An affected place is defined as the relation between:
UW1 – an event, and
UW2 – a place or thing defining a place,
where:
• UW2 is a place that is seen as being affected by the event.

Examples and readings

opl (pat(icl>touch(agt>thing,obj>thing,opl>thing)), shoulder(pof>trunk))	… pat … on shoulder
opl (cut(agt>thing,obj>thing,opl>thing), middle(icl>place))	… cut … in middle

Related Relations

• An affected place is different from **obj** and **cob** in that what is affected by the event is a place rather than other kinds of things.
• An affected place is different from **plc** in that an affected place is directly by the event, while the physical and logical place (**plc**) defines the environment in which the event happens.

or (disjunction)

Or defines a disjunctive relation between two concepts.

or (uw, uw)

Syntax

or [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed definition

A disjunction is defined as the relation between:
UW1 – a concept, and
UW2 – a concept,
where:
• The UWs are different, and
• Some description is true for either UW1 or UW2 (but not both), or
• Some description is true for either UW1 or UW2 (and perhaps both).

Examples and readings

or (leave(agt>thing,obj>place), stay(icl>remain(agt>thing)))	Will you stay or leave?
or (blue(icl>color), red(icl>color))	Is it red or blue?
or (Jack(iof>person), John(iof>person))	Who is going to do it, John or Jack?

Related Relations

• A disjunction is different from a conjunction in that the items of disjunction are grouped in order to say that something is true for one or the other, whereas in a conjunction they are grouped to say that the same is true for both. A disjunction in formal logic permits three situations for it to be true: 1) it is true for UW1, 2) it is true for UW2, and 3) it is true for both. On the other hand, a conjunction only permits the third situation.

per (proportion, rate or distribution)

Per defines a basis or unit of proportion, rate or distribution.

per (thing, thing)

Syntax
per [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition
A proportion, rate or distribution is defined as the relation between:
UW1 – a quantity, and
UW2 – a quantity, or a thing seen as a quantity,
where:
- The UWs are different, and
- UW1 and UW2 form a proportion, where UW1 is the numerator and UW2 is the denominator, or
- UW2 is the basis or unit for understanding UW1, or
- Each UW expresses a different dimension, of size, for example.

Examples and readings

per (hour(icl>period), day(icl>period))	eitgh hours a day
qua (hour(icl>period), 8)	
per (time(icl>frequency), week(icl>period))	… twice a week
qua (time(icl>frequency), 2)	

plc (place)

Plc defines a place where an event occurs, or a state that is true, or a thing that exists.

plc (be, place(icl>thing))
plc (do, place(icl>thing))
plc (occur, place(icl>thing))
plc (thing, place(icl>thing))
plc (uw(aoj>thing), place(icl>thing))

Syntax
plcl [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition
A place is defined as the relation between:
UW1 – an event, a state, or a thing, and
UW2 – a place or thing understood as a place.

Examples and readings

plc (cook(agt>thing), kitchen(pof>building))	… cook … in the kitchen
plc (sit(agt>thing), beside(icl>place))	… sit beside me
plc (cool(icl>cold), here(icl>place))	It's cool here.

Related Relations
- A place is different from **plf** and **plt** or **src** and **go**l in that **plc** describes a place with respect to an event as a whole, whereas these other relations describe the position with respect to parts of an event.
- A place is different from **opl** in that **plc** is not seen as being affected by an event but merely as a reference point for characterizing it, whereas **op**l is seen as being affected.

plf (initial place)

Plf defines a place where an event begins or a state that becomes true.

plf (be, thing)
plf (do, thing)
plf (occur, thing)
plf (uw(aoj>thing), thing)

Syntax
plf [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed definition
An "initial place" (or "place-from") is defined as the relation between:
UW1 – an event or state, and
UW2 – a place or thing defining a place,
where:
- UW2 is the specific place where UW1 started, or
- UW2 is the specific place from where UW1 is true.

Examples and readings

plf (travel(agt>volutional thing), Tokyo(icl>city))	travelling from Tokyo
plf (deep(aoj>thing), there(icl>place))	The sea is deep from there to here.

Related Relations
- An initial place is different from **plc** in that **plc** describes events or states taken as a whole, whereas **plf** describes only the initial part of an event or state.
- An initial place is different from **plt** in that **plt** describes the final part of an event or state, whereas **plf** describes the initial part of an event or state.
- An initial place is different from **src** in that **plf** describes the place where the event began, whereas **src** describes the initial state of the object.

plt (final place)

Plt defines a place where an event ends or a state that becomes false.

plt (be, thing)
plt (do, thing)
plt (occur, thing)
plt (uw(aoj>thing), thing)

Syntax
plt [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed definition
A final place is defined as the relation between:
UW1 – an event or state, and
UW2 – a place or thing defining a place,
where:
- UW2 is the specific place where UW1 ended, or
- UW2 is the specific place where UW2 becomes false.

Examples and readings

plt (travel(agt>volitional thing), Boston(iof>city))	to travel to Boston
plt (deep(aoj>thing), here(icl>place))	The sea is deep from there to here

Related Relations
• A final place is different from **plc** in that **plc** describes events or states taken as a whole, whereas **plt** describes only the final part of an event.
• A final place is different from **plf** in that **plt** describes the final part of an event or state, whereas **plf** describes the initial part of an event.
• A final place is different from **gol** in that **plt** describes the place where an event or state ended, whereas **gol** describes the final state of the object.

pof(part-of)

Pof defines a concept of which a focused thing is a part.

pof (thing, thing)

Syntax
pof [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed definition
Part-of is defined as the relation between:
UW1 – a partial thing, and
UW2 – a whole thing,
where:
• The UWs are different, and
• UW1 is a part of UW2.

Examples and readings

pof (preamble(icl>information), document(icl>information))	the preamble of a document
pof (initial(icl>letter), machine translation)	the initials of Machine Translation

pos (possessor)

Pos defines the possessor of a thing.

pos (thing, volitional thing)

Syntax
pos [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed definition
A possessor is defined as the relation between:
UW1 – a thing or a place, and
UW2 - a human or non-human, seen as a volitional thing
where:
• UW2 is a possessor of UW1.

Examples and readings

pos (dog(icl>aminal), John(iof>person))	John's dog
pos (book(icl>document), I)	my book

ptn (partner)

Ptn defines an indispensable non-focused initiator of an action

ptn (do, thing)

Syntax
ptn [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed definition
A partner is defined as the relation between:
UW1 - an action, and
UW2 - a human or non-human, seen as a volitional thing
where:
• UW1 is a collaborative event initiated by both the agent and the partner, and
• UW2 is thought of as having a direct role in making an indispensable part of UW1 happen, and
• UW2 is seen as not being in focus (as compared to the agent).

Examples and readings

ptn (compete(agt>thing,ptn>thing), John(iof>person))	… compete with John
ptn (share(icl>divide(agt>thing,obj>thing)), poor(icl>person))	… share … with the poor
ptn (collaborate(agt>thing,ptn>person), he)	… collaborate with him …

Related Relations
• A partner is different from **agt** in that an agent and its event are in focus, while a partner and its event are not in focus.
• A partner is different from **cag** in that a co-agent initiates an event that is independent of an agent's event, whereas a partner initiates the same event together with an agent.

pur (purpose or objective)

Pur defines the purpose or objective of an agent of an event or a purpose of a thing that exists.

pur (do, do)
pur (do, thing)
pur (thing, uw)

Syntax
pur [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed definition
A purpose or objective is defined as the relation between:
UW1 – a thing or an action, and
UW2 – a thing or an action,
where:
When UW1 is an action:
• UW2 specifies the agent's purpose or objective, or
• UW2 specifies the thing (object, state, event, etc.) that the agent desires to attain by carrying out UW1, or
When UW1 is a thing:
• UW2 is what UW1 is to be used for.

Examples and readings

pur (come(icl>move(agt>thing,gol>place,src>place)), see(icl>meet(agt>volitional thing,obj>thing)))	… come to see you
pur (work(agt>person), money(icl>mark))	... work for money
pur (budget(icl>expense), research(icl>study))	our budget for research

Related Relations
• A purpose or objective is different from **gol** in that **pur** describes the desires of an agent, whereas **gol** describes the state of the object at the end of an event.
• A purpose or objective is different from **man** and **met** in that **pur** describes the reason (purpose) why the event is being carried out, while **man** and **met** describe how it is being carried out.

qua (quantity)

Qua defines the quantity of a thing or unit.

qua (thing, quantity)

Syntax
qua [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition
A quantity is defined as the relation between:
UW1 – a thing, and
UW2 – quantity,
where:
• UW2 is the number or amount of UW1.

Examples and readings

qua (cup(icl>tabelware), 2))	Two cups of coffee
qua (coffee(icl>beverage), cup(icl>tableware))	
qua (kilogram(icl>unit), many(qua<thing))	many kilograms
qua (dog(icl>animal), 2)	two dogs

Related Relations
• A quantity is different from **per** in that a quantity is an absolute number or amount, whereas **per** is a number or amount relative to some unit of reference (time, distance, etc.).
• A quantity is also used to express iteration, or the number of times an event or state occurs.

rsn (reason)

Rsn defines a reason why an event or a state happens.

rsn (be, be)
rsn (be, do)
rsn (be, thing)
rsn (be, occur)
rsn (be, uw(aoj>thing))
rsn (do, be)
rsn (do, do)
rsn (do, thing)
rsn (do, occur)
rsn (do, uw(aoj>thing))
rsn (occur, be)
rsn (occur, do)
rsn (occur, occur)
rsn (occur, thing)
rsn (occur, uw(aoj>thing))
rsn (uw(aoj>thing), be)
rsn (uw(aoj>thing), do)
rsn (uw(aoj>thing), occur)
rsn (uw(aoj>thing), thing)
rsn (uw(aoj>thing), uw(aoj>thing))

Syntax
rsn [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition
A reason is defined as the relation between:
UW1 – an event or state, and
UW2 – a thing, an event or a state,
where:

• UW2 is a reason why UW1 happens.

Examples and readings

rsn (go(icl>move(agt>thing,gol>place,src>place)).@not, rain(icl>weather))	... didn't go because of the rain
agt:01 (arrive(icl>come(agt>thing,gol>place,src>place)), Mary(iof>person))	They can start because Mary arrived.
rsn (start(icl>begin(agt>thing,obj>thing)), :01)	
rsn (known(aoj>thing), beauty(icl>abstract thing))	a city known for its beauty
aoj (known(aoj>thing), city(icl>region))	
mod (beauty(icl>abstract thing), city(icl>region))	

scn (scene)

Scn defines a scene(world) where an event occurs, or state is true, or a thing exists.

scn (be, thing)
scn (do, thing)
scn (occur, thing)
scn (thing, thing)
scn (uw(aoj>thing), thing)

Syntax
scn [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed definition
A scene is defined as the relation between:
UW1 – an event or state or thing, and
UW2 – an abstract or metaphorical thing (world) understood as a place (scene),
where:
• UW2 is the scene that UW1 happens or is true. When UW2 is a concrete thing or place, it is a metaphorical use, and
• UW1 is true or happens in a scene characterized by UW2.

Examples and readings

scn (win(agt>thing), contest(icl>event))	… win a prize in a contest
scn (appear(gol>thing,obj>thing), program(icl>plan))	… appear on a TV program
scn (play(agt>thing,obj>thing), movie(icl>cinema))	… play in movie

Related Relations
• A scene is different from **plc** in that the reference place for **plc** is in the real place that something happens, whereas for **scn** it is an abstract or metaphorical world.

seq (sequence)

Seq defines a prior event or state of a focused event or state.

seq (do, do)
seq (do, occur)
seq (do, uw(aoj>thing))
seq (occur, do)
seq (occur, occur)
seq (occur, uw(aoj>thing))
seq (uw(aoj>thing), do)
seq (uw(aoj>thing), occur)
seq (uw(aoj>thing), uw(aoj>thing))

Syntax
seq [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed definition
A “sequence” is defined as the relation between:
UW1 – a focused event or state,
UW2 – a prior event or state,
where:
• UW1 occurs or is true after UW2.

Examples and readings

seq (leap(icl>jump(agt>thing)), look(agt>thing,obj>thing))	Look before you leap.
seq (red(aoj>thing), green(aoj>thing))	It was green and then red.
seq (take off(agt>thing,obj>thing), come in(agt>thing))	She came in and took her coat off.

Related Relations
• A sequence is different from **coo** in that **seq** describes events or states that do not occur at the same time, but one after the other, whereas **coo** describes events that occur simultaneously.

src (source: initial state)

Src defines the initial state of an object or thing initially associated with the object of an event.

src (be(aoj>thing,gol>thing), thing)
src (do, thing)
src (do, uw(aoj>thing))
src (occur, thing)
src (occur, uw(aoj>thing))

Syntax
src [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition
An initial state is defined as the relation between:
UW1 – an event, and
UW2 – a state or thing,
where:
• UW2 is the specific state describing the object of UW1 at the beginning of UW1, or
• UW2 is a thing that is associated with the object of UW1 at the beginning of UW1.

Examples and readings

src (change(obj>thing), red(aoj>thing))	The lights changed from green to red.
src (withdraw(agt>thing,obj>thing), stove(icl>furniture))	I quickly withdrew my hand from the stove.

Related Relations
• An initial state is different from **tmf** and **plf** in that src describes qualitative characteristics of the object and not time or place of an event.
• An initial state is different from **gol** in that **gol** describes the characteristics of the object at the final state of the event.

tim (time)

Tim defines the time an event occurs or a state is true.

tim (be, time(icl>abstract thing))
tim (do, time(icl>abstract thing))
tim (occur, time(icl>abstract thing))
tim (thing, time(icl>abstract thing))
tim (uw(aoj>thing), time(icl>abstract thing))

Syntax
tim [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition
Time is defined as the relation between:
UW1 – an event or state, and
UW2 – a time, or an event or a state that can be seen as a time,
where:
• UW1, taken as a whole, occurs at the time indicated by UW2.

Examples and readings

tim (leave(agt>thing,obj>place), Tuesday(icl>day))	… leave on Tuesday
tim (do(agt>thing,obj>thing), o’clock(icl>time))	… do … at … o’clock
tim (start(icl>>begin(agt>thing,obj>thing)), come(icl>move(agt>thing,gol>place,src>place)))	Let’s start when … come

Related Relations
• Time is different from **tmf** and **tmt** in that time characterizes the event or state as a whole, whereas **tmf** and **tmt** describe only parts of the event.
• Time is different from **coo** and **seq** in that time does not describe states and events relatively, with respect to each other, but with respect to certain points in time.

tmf (initial time)

Tmf defines the time an event starts or a state becomes true.

tmf (be, time(icl>abstract thing))
tmf (do, time(icl>abstract thing))
tmf (occur, time(icl>abstract thing))
tmf (thing, time(icl>abstract thing))
tmf (uw(aoj>thing), time(icl>abstract thing))

Syntax
tmf [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition
Initial time is defined as the relation between:
UW1 – an event or state, and
UW2 – a time, or an event or a state that can be seen as a time,
where:
• UW2 specifies the time at which UW1 starts, or
• UW2 specifies the time at which UW1 becomes true.

Examples and readings

tmf (work(agt>person), morning(icl>time))	… work from morning to [till] night
tmf (change(obj>thing), live(agt>volitional thing))	… has changed … since I have lived here.

Related Relations
• Initial time is different from **tim** in that **tmf** expresses the time at the beginning of the event or state whereas **tim** expresses the time for the event taken as a whole.
• Initial time is different from **src** in that **tmf** expresses the time at the beginning of the event or state whereas **src** expresses characteristics of the object at the beginning of the event.
• Initial time is different from **tmt** in that **tmf** expresses the time at the beginning of the event or state whereas **tmt** expresses the time at its end.

tmt (final time)

Tmt defines a time an event ends or a state becomes false.

tmt (be, time(icl>abstract thing))
tmt (do, time(icl>abstract thing))
tmt (occur, time(icl>abstract thing))
tmt (thing, time(icl>abstract thing))
tmt (uw(aoj>thing), time(icl>abstract thing))

Syntax
tmt [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed definition
Final time is defined as the relation between:
UW1 – an event or state, and
UW2 – a time, or an event or a state that can be seen as a time,
where:
- UW2 specifies the time at which UW1 ends, or
- UW2 specifies the time at which UW1 becomes false.

Examples and readings

tmt (work(agt>person), night(icl>time))	… work from moning to [till] night
tmt (full(aoj>thing), tomorrow(icl>time))	… be full till tomorrow

Related Relations
- Final time is different from **tim** in that **tmt** expresses the time at the end of the event or state, whereas **tim** expresses the time for the event taken as a whole.
- Final time is different from **gol** in that **tmt** expresses the time at the end of the event or state, whereas **gol** expresses characteristics of the object at the end of the event.
- Final time is different from **tmf** in that **tmt** expresses the time at the end of the event or state, whereas **tmt** expresses the time at the beginning of the event.

to (destination)

To defines a final state of a thing or a final thing (destination) associated with the focused thing.

to (thing, thing)

Syntax
to [":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>} "," {<UW2>|":"<Compound UW-ID>} ")"

Detailed definition
A destination is defined as the relation between:
UW1 – a thing, and
UW2 – a state or a thing that can be seen as destination,
where:
- The UWs are different, and
- UW1 is the focused thing, and
- UW2 is the final state describing the focused thing UW1, or
- UW2 is a thing that is finally associated with the UW1, destination such as the final position of UW1.

Examples and readings

to (train(icl>vehicle), London(iof>city))	a train for London
to (letter(icl>document), you)	a letter to you

Related Relations
- A destination is different with **gol** in that **gol** is a relation used with an event or a state, whereas **to** is directly linked to a thing. For instance, "a letter to you" is expressed as "**to** (letter(icl>document), you)", whereas "a

letter sent to you” is expressed as “**gol** (send(agt>thing,gol>thing,obj>thing), you)” and “obj (send(agt>thing,gol>thing,obj>thing), letter(icl>document))”.

via (intermediate place or state)

Via defines an intermediate place or state of an event.

via (do, thing)
via (occur, thing)

Syntax
via [“:”<Compound UW-ID>] “(“ {<UW1>|“:”<Compound UW-ID>} “,” {<UW2>|”:”<Compound UW-ID>} “)”

Detailed definition
An intermediate place or state is defined as the relation between:
UW1 – an event, and
UW2 – a place or state,
where:
- UW2 is the specific place or state describing the object of UW1 at some time in the middle of UW1,
- UW2 is a thing that describes a place or state that the object of UW1 passed by or through during UW1.

Examples and readings

via (go(icl>move(agt>thing,gol>place,src>place)), New York(iof>city))	… go … via New York
via (bike(agt>thing), Alps(iof>mountain))	… bike … through the Alps
via (drive(agt>thing), tunnel(icl> facilities))	… drive … by way of the tunnel

Related Relations
- An intermediate place or state is different from **src**, **plf** and **tmf** in that these all refer to the beginning of an event, whereas **via** describes the middle of an event.
- An intermediate place or state is different from **gol**, **plt** and **tmt** in that these all refer to the end of an event, whereas **via** describes the middle of an event.

Chapter 3: Universal Words

Universal Words are words that constitute the vocabulary of UNL. A Universal Word is not only a unit of the UNL syntactically and semantically for expressing a concept, but also a basic element for constructing a UNL expression of a sentence or a compound concept. Such a Universal Word is represented as a node in the hyper-graph of UNL expressions.

There are two classes of UWs from the viewpoint in the composition:
- labels defined to express unit concepts and called “UWs” (Universal Words), and
- a compound structures of a set of binary relations grouped together and called “Compound UWs”.

3.1 UWs

3.1.1 Syntax of UW

A UW is made up of a character string (an English-language word) followed by a list of constraints. The meaning and function of each of these parts is described in the next section, on Interpretation.
The following is the syntax of description of UWs:

```
<UW>                ::= <headword> [<constraint list>]
<headword>          ::= <character>…
<constraint list>   ::= “(“ <constraint> [ “,” <constraint>]… “)”
<constraint>        ::= <relation label> { “>” | “<” } <UW> [<constraint list>] |
                          <relation label> { “>” | “<” } <UW> [<constraint list>]
                          [ { “>” | “<” } <UW> [<constraint list>] ] …
<relation label>    ::= “agt” | and” | “aoj” | “obj” | “icl” | ...
<character>         ::= “A” | ... | “Z” | “a” | ... | “z” | 0 | 1 | 2 | ... | 9 | “_” | ” “ | “#” | “!” | “$” | “%” | “=” | “^” |
                          “~” | “|” | “@” | “+” | “-“ | “<” | “>” | “?”
```

3.1.2 Interpretation

Headword

The headword is an English word/compound word/phrase/sentence that is interpreted as a label for a set of concepts: the set made up of all the concepts that may correspond to that in English. A Basic UW (with no restrictions or constraint list) denotes this set. Each Restricted UW denotes a subset of this set that is defined by its constraint list. Extra UWs denote new sets of concepts that do not have English-language labels.
Thus, the headword serves to organize concepts and make it easier to remember which is which.

Constraints or Restrictions

The constraint list restricts the interpretation of a UW to a subset or to a specific concept included within the Basic UW, thus the term “Restricted UWs”. The Basic UW “drink”, without a constraint list, includes the concepts of “putting liquids in the mouth”, “liquids that are put in the mouth”, “liquids with alcohol”, “absorb” and others. The Restricted UW ‘drink(agt>thing,obj>liquid)’ denotes the subset of these concepts that includes “putting liquids in the mouth”, which in turn corresponds to verbs such as “drink”, “gulp”, “chug” and “slurp” in English.

A restriction of a UW is made up of a pair of a relation and a defined UW (or part expression of a defined UW) that holds the relation with this UW. If more than one restrictions are necessary, a comma “,” should be used between restrictions. A Restricted UW is defined through a Master Definition[1]. In a Master Definition, full expressions of defined UWs must be described in the restrictions, whereas as for a UW, if and only if the

---

1 For details please refer to UW Manual

uniqueness can be kept, part of the pre-defined UWs (its headword or part restrictions) can be used in the restrictions. Relation labels used in the constraint list must be defined in the UNL specifications and should be sorted in alphabetical order if more than one restrictions are used.

In order to define the meaning of a UW more accurately, for instance, a subset concept of UW is always defined under an upper UW that has the closest but more general meaning. This is implemented by linking the UW to be defined with the upper UW using ‘icl’ relation. For example, UW ‘provide(icl>give(agt>thing,gol>thing,obj>thing))’ is defined as a subset concept of UW ‘give(agt>thing,gol>thing,obj>thing)’. However if the headword of the upper UW is either of “be”, “do”, “occur” and “uw”, such a headword is not necessary to remain in the restrictions of lower UWs as the each set of restrictions of these upper UWs is set enough to restrict their lower UWs. For example, from Master Definition ‘drink({icl>do(}agt>thing,obj>liquid{)})’ a UW ‘drink(agt>thing,obj>liquid)’ and a binary relation ‘icl(drink(agt>thing,obj>liquid), do(agt>thing,obj>liquid))’ are generated. The part related to the headword “do” is removed from its lower UW expression and the binary relation that will be described in the UNLKB shows that ‘drink(agt>thing,obj>liquid)’ is a subset concept of ‘do(agt>thing,obj>liquid)’. For details of description of UW please refer to UW manual.

3.1.3 Types of UW

A UW is a character string and most of the UWs are basically made up of an English expression with restrictions. A UW can express various levels’ concepts depending on the restrictions and can be used to express a more specific or particular concept or an instance by giving attributes and IDs or restrictions from other UNL expressions. The UWs are divided into four types:

- Basic UWs, which are bare headwords with no constraint list, for example:

  go
  take
  house
  state

- Restricted UWs, which are headwords with a constraint list, for example:

  state(icl>express(agt>thing,gol>person,obj>thing))
  state(icl>country)
  state(icl>region)
  state(icl>abstract thing)
  state(icl>government)

- Extra UWs, which are a special type of Restricted UW, for example:

  ikebana(icl>flower arrangement)
  samba(icl>dance)
  soufflé(icl>food)

- Temporary UWs, which are not necessary to define, for example:

  1234
  http://www.undl.org/

Basic UWs

Basic UWs are character strings that correspond to English words. Such a basic UW denotes all the concepts that may correspond to those in English. However a basic UW is not used when the English expression is ambiguous. Such a basic UW is usually used as the headwords of Restricted UWs for its various specific concepts. A basic UW is used when the English expression has no ambiguity.

Restricted UWs

Restricted UWs are by far the most important. A Restricted UW is made up of a headword (English expression) with restrictions. It is necessary when the English expression of headword has broader sense (more meanings) than the concept aimed to define. The restrictions restrict the range of the concept that an English expression represents. Each Restricted UW made from an English expression represents a more specific or particular concept, or a subset of the concepts of the English expression.

For example, following are the Restricted UWs made from the English word “state”:

> **state((icl>express(agt>thing,gol>person,obj>thing))** is a more specific concept that denotes an action in which humans express something.
> **state(icl>country)** is a more specific sense of “state” that denotes a country.
> **state(icl>region)** is a more specific sense of “state” that denotes a region of a country.
> **state(icl>abstract thing)** is a more specific sense of “state” that denotes a kind of condition that persons or things are in. This UW is defined as a more general concept that can be referred to when defining other synonymous UWs, such as “situation” or “condition”.
> **state(icl>government)** is a more specific sense of “state” that denotes a kind of government.

The information in parentheses is the constraint list and it describes some conceptual restrictions; this is why they are called Restricted UWs. Informally, the restrictions mean “restrict your attention to this particular sense of the word”.

Extra UWs

Extra UWs denote concepts that are not found in English and therefore have to be introduced as extra categories. Foreign-language words are used as headwords using English (Alphabetical) characters.

For example, following are the examples of Extra UWs:

> **ikebana(icl>flower arrangement)** is “a kind of flower arrangement” for the meaning of “something you do with flowers”,
> **samba(icl>dance)** is “a kind of dance”, and
> **soufflé(icl>food)** is “a kind of food”.

To the extent that these concepts exist for English speakers, they are expressed with foreign-language loanwords and do not always appear in English dictionaries. So they simply have to be added to be able to use these specific concepts in the UNL system. The restrictions give the idea of what kind of concept is associated with these Extra UWs and the constraints provide the binary relations between this concept and other, more general, concepts already defined. Needless to say, an Extra UW is also defined through a Master Definition, and a defined UW or its part expression must be used in the restrictions of an Extra UW.

Temporary UWs

A number or an address of email that has to be used as it is not necessary to define. They can appear in a UNL document and are treated as temporary UWs.

3.2 Compound UWs : Scopes

Compound UWs are a set of binary relations that are grouped together to express a compound concept. A sentence itself is considered as a compound UW. Compound UWs denote compound concepts that are to be interpreted/understood as a whole so that one can talk about their parts all at the same time. A compound UW is expressed by a scope in UNL expressions. A scope makes it possible when a compound UW is necessary to be connected with other UWs.

Consider the following example:
[Women who wear big hats in movie theaters] should be asked [to leave].
The part of the sentence within square brackets is what should be asked. Only when they are grouped together and considered as a whole unit can the correct interpretation be obtained.

Attributes can be attached to them to express negation, speaker attitudes, etc., which are usually interpreted as modifying the main UW (attached with @entry) and its coordinate UWs within the compound UW (scope).

3.2.1 The way to define a Compound UW

A Compound UW is defined by placing a Compound UW-ID immediately after the Relation Label in all of the binary relations that are to be grouped together. Thus, in the example below, ":01" indicates all of the elements that are to be grouped together to define Compound UW number 01.

```
agt:01(wear(aoj>thing,obj>hat), woman(icl>person).@pl)
obj:01(wear(aoj>thing,obj>hat), hat(icl>wear))
aoj:01(big(aoj>thing), hat(icl>wear))
plc:01(wear(aoj>thing,obj>hat), theater(icl>facilities))
mod:01(theater(icl>facilities), movie(icl>art))
agt:01(leave(agt>thing,obj>place).@entry, woman(icl>person).@pl)
```

After this group has been defined, wherever the Compound UW-ID is, for instance "01" in the above example, it can be used to cite the Compound UW. The way to cite a Compound UW is explained in the next section.
A Compound UW is considered as a sentence or sub-sentence, so in the definition of a Compound UW one entry node marked by @entry is necessary.

3.2.2 The way to cite a Compound UW

Once defined, a Compound UW can be cited or referred to by simply using the Compound UW-ID as an UW. The method is to indicate the Compound UW-ID following a colon ":". The reference to a Compound UW is also called a Scope Node. The Scope Node has the following syntax:

<Scope Node>	::= ":" <Compound-ID> [<Attribute List>]
<Compound-ID>	::= two digits of a number "01" – "99", except "00"
<Attribute List>	::= { "." <Attribute> } …
<Attribute>	::= "@entry" | "@may" | "@past" | ...

To complete the UNL expression of "[Women who wear big hats in movie theaters] should be asked [to leave]", the following are necessary:

```
obj(ask(agt>thing,gol>person,obj>uw).@should.@entry, :01)
gol(ask(agt>thing,gol>person,obj>uw).@should.@entry, woman(icl>person).@pl.@topic)
```

'obj(ask(agt>thing,gol>person,obj>uw).@should.@entry, :01)' shows that Scope 01 is the obj of "ask".
':01' shows the scope node. It is interpreted as the whole set of binary relations defined above. It means that ":01" should be understood as comprising all of these binary relations. Compound UWs can be cited within other Compound UWs.

Chapter 4: Attributes

Attributes of UWs are mainly used to describe the subjectivity of sentences. They show what is said from the speaker's point of view: how the speaker views what is said. This includes phenomena technically called "speech acts", "propositional attitudes", "truth values", etc.

Relations and UWs are used to describe the objectivity of sentences. Attributes of UWs enrich this description with more information about how the speaker views these states-of-affairs and his attitudes toward them. Such attributes play the role of bridging the conceptual world represented by UWs and relations, and the real world. In other words, such attributes bring the concept defined by UWs and relations into the real world.

4.1 Time with respect to the Speaker

Where does the speaker situate his description in time, taking his moment of speaking as a point of reference? A time before he spoke? After? At approximately the same time? This is the information that defines "narrative time" as past, present or future. These Attributes are attached to the main predicate.

Although in many languages this information is signaled by tense markings on verbs, the concept is not tense, but "time with respect to the speaker". The clearest example is the simple present tense in English, which is not interpreted as the present time, but as "independently of specific times".
Consider the example: The earth is round.
This sentence is true in the past, present and future, independently of the speaker's time, so although the tense is "present" it is not interpreted as the present time.

@past	happened in the past	ex) It was snowing yesterday
@present	happening at present	ex) It is raining hard.
@future	will happen in future	ex) He will arrive tomorrow

4.2 The Speaker's View of Aspect

A speaker can emphasize or focus on part of an event or treat it as a whole unit. This is closely linked to how the speaker places the event in time. These Attributes are attached to the main predicate.
The speaker can focus on the beginning (@begin) of the event, looking forward to it (@begin.@soon), or backward to it (@begin.@just).
He can also focus on the end (@end) or completion (@complete) of the event, looking forward to it (@end.@soon or @complete.@soon), or backward to it (@end.@just or @complete.@just).
He can focus on the middle (@progress) or continuation (@continue) of the event.
The speaker can choose to focus on the lasting effects or final state of the event (@state) or on the event as a repeating unit (@repeat), experience (@experience) or custom (@custom).
He can also focus on the incompleteness or the fact that it has not yet happened, by using @yet.

@begin	beginning of an event or a state	ex) It began to work again.
@complete	finishing/completion of a (whole) event.	ex) I've looked through the script. look.@entry.@complete
@continue	continuation of an event	ex) He went on talking. talk.@continue.@past
@custom	customary or repetitious action	ex) I used to visit [I would often go] there when I was a boy. visit.@custom.@past
@end	end/termination of an event or a state	ex) I have done it. do.@end.@present
@experience	experience	ex) Have you ever visited Japan? visit.@experience.@interrogation ex) I have been there. visit.@exterience
@progress	an event is in progress	ex) I am working now.

		work.@progress.@present
@repeat	repetition of an event	ex) It is so windy that the tree branches are knocking against the roof. knock.@entry.@present.@repeat
@state	final state or the existence of the object on which an action has been taken	ex) It is broken. break.@state

These attributes are used to modify the attributes above, to express a variety of aspects of natural languages.

@just	Expresses an event or a state that has just begun or ended/completed	Ex) He has just come. come.@complete.@just
@soon	Expresses an event or a state that is about to begin or end/completed	Ex) The train is about to leave. leave.@begin.@soon
@yet	Expresses an event or a state that has not yet started or ended/completed, together with *@not*.	Ex) I have not yet done it. do.@complete.@not.@yet

4.3 Reference to the range of a concept

Whether an expression refers to a single individual, a small group or a whole set is often not clear. The expression “the lion” is not sufficiently explicit for us to know whether the speaker means “one particular lion” or “all lions”. Consider the following examples:
The lion is a feline mammal.
The lion is eating an antelope.
In the first example, it seems reasonable to suppose that the speaker understood “the lion” as “all lions”, whereas in the second example as “one particular lion”.
The following Attributes are used to make explicit what the speaker’s view of reference seems to be.

@generic	generic concept	ex) The dog is a faithful animal.
@def	already referred	ex) the book you lost
@indef	non-specific class	ex) There is a book on the desk.
@not	complement set	ex) Don’t be late!
@ordinal	ordinal number	ex) the 2^{nd} door

These attributes are usually attached to UWs that denote things.

4.4 The Speaker’s View of Emphasis, Focus and Topic

The speaker can choose to focus or emphasize parts of a sentence to show how important he thinks they are in the situation described. This is often related to sentence structure.

@contrast	Contrasted UW	For instance, “but” in the examples below is used to introduce a word or phrase that contrasts with what was said before. ex) It wasn’t the red one <u>but the blue one</u>. ex) He’s poor <u>but happy</u>.
@emphasis	Emphasized UW	ex) I do <u>like</u> it.
@entry	Entry or main UW of a sentence or a scope	ex) He <u>promised</u> (entry of the sentence) that he would <u>come</u> (entry of the scope)
@qfocus	Focused UW of a question	ex) Are you painting the <u>bathroom</u> blue? To this question, the answer will be “No, I’m painting the LIVING-ROOM blue”
@theme	Instantiates an object from a different class	
@title	Title	ex)
@topic	Topic	ex) He(@topic) was killed by her. ex) The girl(@topic) was given a doll. ex) This doll(@topic) was given to the girl.

One UW marked with "@entry" is essential for each UNL expression or in a Compound UW.

4.5 The Speaker's Attitudes

The speaker can also express, directly or indirectly, what his attitudes or emotions are towards what is being said or whom it is being said to. This includes respect and politeness towards the listener and surprise toward what is being said.

@affirmative	**Affirmation**
@confirmation	**Confirmation** ex) You won't say that, will you? ex) It's red, isn't it? ex) Then you won't come, right?
@exclamation	**Feeling of exclamation** ex) kirei na! ("How beautiful (it is)!" in Japanese) ex) Oh, look out!
@humility	**In a humility manner to express something** ex) That is quite impossible for the likes of me.@humility.
@imperative	**Imperative** ex) Get up! ex) You will please leave the room.
@interrogative	**Interrogation** ex) Who is it?
@invitation	**Inducement to do something** ex) Will / Won't you have some tea? ex) Let's go, shall we?
@polite	**Polite way to express something** ex) Could you (please)... ex) If you could … I would …
@request	**Request** ex) Please don't forget…
@respect	**Respectful feeling. In many cases, some special words are used.** ex) o taku ("(your) house" in Japanese) ex) Good morning, sir.
@vocative	**Vocative** ex) Boys, be ambitious!

4.6 The Speaker's Feelings, Judgement and Viewpoint

These attributes express the speaker's feelings or how the speaker views or judges what is said.

This sort of subjective information is very much dependent on the type of language. It should be possible to express every kind of subjective information from all languages. Thus, the development of the attributes is open to the developers of each language, who can introduce a new attribute when no current attribute expresses its meaning. The new attribute must be also introduced in the same way.

The following attributes are used to clarify the speaker's viewpoint information.

- Ability

@ability	**Ability, capability of doing something** ex) The child can 't walk yet. ex) He can speak English but he can't write it very well.

- Beneficialty

@get-benefit	**Speaker's feeling of receiving benefits through the fact or result of something (to be) done by somebody else**

	ex) I'll have my secretary type the letter. *In Japanese the auxiliary verb of "~te morau" is used to express the getting benefits feeling. For instance it is frequently used in a sentence in the sense of "to have somebody do something" in Japanese.
@give-benefit	**Speaker's feeling of giving benefits by doing something for somebody else** ex) Be kind to old people. *In Japanese the auxiliary verb of "~te ageru" is used to express the giving benefits feeling. For instance it is frequently used in a sentence in the sense of "Be kind to old people" in Japanese.

- Conclusion

@conclusion	**Logical conclusion due to a certain condition** ex) He is her husband; she is his wife.
@consequence	**Logical consequence** ex) He was angry, wherefore I left him alone.

- Condition

@sufficient	**Sufficient condition** ex) only have to

- Consent and dissent

@consent	**Consent feeling of the speaker about something**
@dissent	**Dissent feeling of the speaker about something** ex) But that's not true.
@grant	**To give/get consent/permission to do something** ex) Can I smoke in here? ex) You may borrow my car if you like.
@grant-not	**Not to give consent to do something** ex) You {mustn't/are not allowed to/may not} borrow my car.

- Expectation

@although	**Something follows against [contrary to] or beyond expectation** ex) Although he didn't speak, I felt a certain warmth in his manner.
@discontented	**Discontented feeling of the speaker about something** ex) (I'll tip you 10 pence.) But that's not enough!
@expectation	**Expectation of something** ex) Children ought to be able to read by the age of 7. ex) If you leave now, you should get there by five o'clock.
@wish	**Wishful feeling, to wish something is true or has happened** ex) If only I could remember his name! (~I do wish I could remember his name!) ex) You might have just let me know.

- Intention

@insistence	**Strong determination to do something** ex) He will do it, whatever you say.
@intention	**Intention about something or to do something** ex) He shall get this money. (Speaker's intention) ex) We shall let you know our decision.
@want	**Desire to do something** ex) I want to go France.
@will	**Determination to do something** ex) I'll write as soon as I can. ex) We won't stay longer than two hours.

- Necessity and obligation

@need	**Necessity to do something** ex) You need to finish this work today. ex) I must be going now. ex) I always have to work hard.
@obligation	**Obligation to do something according to (quasi-) law, contract, or …** ex) The vendor shall maintain the equipment in good repair. ex) You must come by nine.
@obligation-not	**Obligation not to do something, forbid to do something according to (quasi-) law, contract or …** ex) Cars must not park in front of the entrance. ex) No smoking
@should	**To do something as a matter of course** ex) You should do as he says. ex) You ought to start at once.
@unavoidable	**Unavoidable feeling of the speaker about doing something** ex) I could not help speaking the truth.

- Possibility

@certain	**Certainty that something is true or happens** ex) If Peter had the money, he would have bought a car. ex) They should be home by now.
@inevitable	**Logical inevitability that something is true or happens** ex) All living things must die.
@may	**Practical possibility that something is true or happens** ex) It may be true. ex) It could be.
@possible	**Logical possibility that something is true or happens** ex) Anybody can make mistakes. ex) If Peter had the money, he would buy a car.
@probable	**(Practical) probability that something is true or happens** ex) That would be his mother. ex) He must be lying.
@rare	**Rare logical possibility that something is true or happens** ex) If such a thing should happen, what shall we do? ex) If I should fail, I will [would] try again.
@unreal	**Unreality that something is true or happens** ex) If we had enough money, we could buy a car. ex) If Peter had the money, he could buy a car.

- feeling

@admire	**Admiring feeling of the speaker about something**
@blame	**Blameful feeling of the speaker about something** ex) A sailor, and afraid of the sea!
@contempt	**Contemptuous feeling of the speaker about something** ex) You never could do it *In Japanese the postpositional particles of “nado”, “nanka” or “nante” as in “kimi nado niha..” can be used to express the contemptuous feeling of the speaker about the target, mainly in a negative sentence
@regret	**Regretful feeling of the speaker about something** ex) It's a pity that he should miss such a golden opportunity.
@surprised	**Surprised feeling of the speaker about something** ex) (He has succeeded!) But that's great!
@troublesome	**Troublesome feeling of the speaker about the occurrence of something** ex) My house was [I had my house] broken into.@troublesome yesterday.

	*There is a troublesome feeling of the speaker when using a passive form of the verb in this case in Japanese.

4.7 Convention

Typical UNL structures can be expressed by attributes to avoid the complexity of enconverting and deconverting. What marks are used for enclosing a word or phrase can also be expressed by attributes. The attributes for indicating enclosure must be attached to the scope node of the enclosed phrase if it consists of a (set of) binary relation(s) of UNL.

@passive	passive form	ex) Being bitten.@passive by a dog ...
@pl	more than one	ex) children: child(icl>young person).@pl
@angle_bracket	< > are used	
@brace	{ } are used	
@double_parenthesis	(( )) are used	
@double_quote	“ ” are used	
@parenthesis	( ) are used	
@single_quote	‘ ’ are used	
@square_bracket	[ ] are used	

Chapter 5: Format of UNL Expressions

UNL expressions are provided in the format of UNL documents. A UNL document is a text file that includes the original sentences, UNL document tags, UNL expressions and etc.

5.1 UNL Document

A UNL document is enclosed with tags “[D:<dinf>]” and “[/D]”. Within these tags, each paragraph is enclosed with a pair of tags “[P:<p_num>]” and “[/P]”, and each sentence is enclosed with a pair of tags “[S:<s_num>]” and “[/S]”. Inside a sentence, the source text is enclosed with “{org:<l_tag>}” and “{/org}”, its UNL expression is enclosed with “{unl:<uinf>}” and “{/unl}”. Sentences of target languages can also be stored in the UNL document. Each target sentence is enclosed with a pair of language tags “{<l_tag>}” and “{</l_tag>}” following the UNL expression of each sentence.

Description format of a UNL document is the following:

```
<UNL Document>        ::= "[D:" <dinf> "]"
                          { "[P:" <paragraph number> “]"
                          { "[S:" <sentence number> "]"
                          <sentence>
                          "[/S]" }
                          ...
                          "[/P]" }
                          ...
                          "[/D]"
<dinf>                ::= <document name> "," <author name> [ "," <document ID> "," <date> ","
                          <email address> ]
<document name>       ::= "dn=" <character string>
<author name>         ::= "on=" <character string>
<document ID>         ::= "did=" <character string>
<date>                ::= "dt=" <character string>
<email address>       ::= "mid=" <character string>
<sentence>            ::= "{org:" <l-tag> [ "=" <code> ] "}"
                          <source sentence>
                          "{/org}"
                          "{unl" [ ":" <uinf> ] "}"
                          <UNL expression>
                          "{/unl}"
                          { "{" <l-tag> [ "=" <code> ] [ ":" <sinf> "]" "}"
                          <target sentence>
                          "{/" <l-tag> "}" }
                          ...
                          /* whole information that necessary for a sentence */
<l-tag>               ::= "ab" | "cn" | "de" | "el" | "es" | "fr" | "id" | "hd" | "it" | "jp" | "lv" | "mg" | "pg" |
                          "ru" | "sh" | "th"    /* language codes : language tags */
<code>                ::= <character code name>
<character code name> ::= <character string>
<source snetence>     ::= <character string>
<target sentence>     ::= <character string>
<uinf>                ::= <system name> "," <post-editor name> "," <reliability> [ "," <date> ","
                          <email address> ]
<sinf>                ::= <system name> "," <post-editor name> "," <reliability> [ "," <date ","
                          <email address> ]
<system name>         ::= "sn=" <character string>
<post-editor name>    ::= "pn=" <character string>
<reliability>         ::= "rel=" <a number>
<paragraph number>    ::= <a number>
```

<sentence number>	::= <a number>

The tags used in a UNL document are the following:

[D:<dinf>]	indicates the Beginning of a document and the necessary information about the document
[/D]	indicates the End of a document
[P:<p_num>]	indicates the Beginning of a paragraph
[/P]	indicates the End of a paragraph
[S:<s_num>]	indicates the Beginning of a sentence and the sentence number
[/S]	indicates the End of a sentence
{org:<l_tag>=<code>}	indicates the Beginning of an original/source sentence, language and character code, "=<code>" can be omitted.
{/org}	indicates the End of an original sentence
{unl:<uinf>}	indicates the Beginning of the UNL expressions of a sentence and necessary information, ":<uinf>" can be omitted.
{/unl}	indicates the End of the UNL expressions of a sentence
{<l_tag>}	indicates the Beginning of a target sentence of the language indicated by <l_tag>
{/<l_tag>}	indicates the End of a target sentence of the language indicated by <l_tag>

See the following section about <UNL expression>.

5.2 UNL Expression

A UNL expression of a sentence is identified with the following tags: {unl} and {/unl}.

Any component, such as a word, phrase and, of course, a sentence of a natural language can be represented with UNL expressions. A UNL expression therefore consists of a UW or a (set of) binary relation(s). In UNL documents, a UNL expression for a sentence is enclosed by the tags {unl} and {/unl} inside [S] and [/S]. If a UNL expression consists of a UW, this UW should be enclosed further by the tags [W] and [/W]. If necessary, the whole sentence can also be expressed as a scope. In this case, the Compound UW-ID of the scope should be enclosed by [W] and [/W].

There are two forms for expressing UNL expressions, one is the table form and the other is the list form. The table form is made up of a set of binary relations, and each binary relation is expressed by connecting the two related UWs directly. And the list form is divided into two parts: a list of UWs corresponding IDs and a list of binary relations described by the IDs. The table form of a UNL expression is more readable than the list form, but the list form of a UNL expression is more compact than the table form. These two forms are convertible with each other.

5.2.1 The table form of UNL expression

- A UNL expression consists of a set of binary relations:

```
{unl}
<binary relation>
...
{/unl}
```

- A UNL expression consists of a UW:

```
{unl}
[W]
<UW><attribute list>
[/W]
```

```
{/unl}
```

- A UNL expression consists of a scope:

```
{unl}
[W]
": "<compound UW-ID><attribute list>
[/W]
<binary relation>
...
{/unl}
```

Each tag and binary relation should end with a return code: "0x0a".

Syntax of binary relation

Description format of a binary relation of the table form is the following:

<binary relation>	::= <relation> [":"<compound UW-ID>] "(" {{ <UW$_1$> [":" <UW-ID$_1$>]} | { ":" <compound UW-ID$_1$> }}[<attribute list>] "," {{ <UW$_2$> [":" <UW-ID$_2$>]} | { ":" <compound UW-ID$_2$> }}[<attribute list>] ")"
<relation>	::= a relation label, defined in "Chapter 2 Relations"
<UW>	::= a UW, see "Chapter 3 Universal Words"
<attribute list>	::= { "." <attribute> } …
<attribute>	::= an attribute, see "Chapter 4 Attributes"
<UW-ID>	::= two alphanumeric characters of '0' - '9' and 'A' - 'Z'
<compound UW-ID>	::= two digits of "00" - "99". "00" must be used for the main sentence and can be ommited.

Compound UW-ID

A UNL expression can include more than one scope. Compound UW-IDs are for identifying each concept specified by compound UWs (scopes) in a UNL expression. A scope is a group of binary relations that can be referred to as a UW by indicating its compound UW-ID in the format of ":<Compound UW-ID>". A node described in this way in the UNL expression network that refers to a scope is called a "Scope Node". For details about the scope please refer to "3.2 Compound UWs".

UW-ID

UW-IDs are for identifying each concept specified by UWs in a UNL expression. If a UW appears in a UNL expression more than once and means different concepts (things or events), a unique UW-ID must be given to each concept of the UWs.

The following shows an example of UNL expressions of the sentence "I can hear a dog barking outside":

```
{unl}
agt(hear(icl>perceive(agt>person,obj>thing)).@entry,       I)
obj(hear(icl>perceive(agt>person,obj>thing)).@entry,       :01)
agt:01(bark(agt>dog).@entry,       dog(icl>canine))
plc:01(bark(agt>dog).@entry,       outside(icl>place))
{/unl}
```

In above UNL expression, "**agt**", "**obj**" and "**plc**" are relation labels, "**I**", "**bark(agt>dog)**", "**dog(icl>canine)**", "**hear(icl>perceive(agt>person,obj>thing))**" and "**outside(icl>place)**" are UWs. "a dog barking outside" is expressed by a scope, and "**01**" is given as the compound UW-ID to the scope. ":01" appears in the position of a UW is the scope node to refer to the scope. Binary relations indicated by the Compound UW-ID define the contents of the scope.

5.2.2 The list form of UNL expression

The list form of a UNL expression consists of a set of UWs and a set of encoded binary relations (expressed by UW-IDs) of a sentence. In case a whole sentence is treated as a scope, the Compound UW-ID of the scope for the sentence can be included in the UW list between [W] and [/W].

```
{unl}
[W]
{<UW> | {":"<compound UW-ID>}}[<attribute list>]":"<UW-ID>
…
[/W]
[R]
<binary relation by UW-IDs>
…
[/R]
{/unl}
```

The tags used above have the following meanings.

[W]	indicates the Beginning of the UW list.
[/W]	indicates the End of the UW list.
[R]	indicate the Beginning of the encoded binary relations.
[/R]	indicates the End of the encoded binary relations.

Each tag, encoded binary relation and UW should end with a return code: "0x0a".

UW List

UWs of a UNL expression must be listed between [W] and [/W] with different (unique) UW-IDs for different concepts. This means that the same UW expression but express different concepts (instances) must be given different UW-IDs. A scope must be defined again in the UW list.

Syntax of an encoded binary relation

<binary relation by UW-IDs>	:= <UW-ID$_1$><relation>[":"<Compound UW-ID>]<UW-ID$_2$>
<UW-ID>	:= two alphanumeric characters of "0" – "9" and "A" – "Z"
<Compound UW-ID>	:= two digits of "00" – "99"

For instance, the following shows an example of the list form of a UNL expression of the sentence "I can hear a dog barking outside".

```
{unl}
[W]
I:01
hear(icl>perceive(agt>person,obj>thing)).@entry:02
dog(icl>canine):03
bark(agt>dog).@entry:04
outside(icl>place):05
:01:06
[/W]
[R]
02aoj01
02obj06
04agt:0103
04plc:0105
[/R]
{/unl}
```

In the above example, between [W] and [/W], UWs ‘I’, ‘hear(icl>perceive(agt>thing,obj>thing))’, ‘dog(icl>canine)’, ‘bark(agt>dog),’ ‘outside(icl>place)’ and the scope node “:01” are given a UW-ID from 01 to 06 respectively.

Between [R] and [/R], binary relations are described using the UW-IDs defined in the UW list. For example, ”02obj06” in the second line shows that the concept identified by UW-ID 06 is the ‘obj’ of the concept identified by UW-ID 02. UW-ID 06 means the concept of scope 01, and UW-ID 02 means the concept of ‘hear(icl>perceive(agt>thing,obj>thing))’.

Binary relations “04agt:0103” and “04plc:0105” express the UNL expression of scope 01. This is indicated by the CompoundUW-ID “01” described following the relations ‘agt’ and ‘plc’.

Appendix 1: Syntax Definition Notation

::=	indicates the left is defined as the right
|	indicates two disjunctive elements: “or”
[ ]	indicates an optional element
{}	indicates an alternative element
…	indicates repetition of the previous element, 0 or more than 1 time
“ ”	encloses a string of literal characters
< >	indicates a variable name
^	indicates negation

Appendix 2: Relation Labels

agt	agent	a thing in focus that initiates an action
and	conjunction	a conjunctive relation between concepts
aoj	thing with attribute	a thing that is in a state or has an attribute
bas	basis	a thing used as the basis (standard) of comparison
ben	beneficiary	an indirectly related beneficiary or victim of an event or state
cag	co-agent	a thing not in focus that initiates an implicit event that is done in parallel
cao	co-thing with attribute	a thing not in focus that is in a parallel state
cnt	content	the content of a concept
cob	effected co-thing	a thing that is directly affected by an implicit event done in parallel or an implicit state in parallel
con	condition	a non-focused event or state that conditions a focused event or state
coo	co-occurrence	a co-occurrent event or state for a focused event or state
dur	duration	a period of time during which an event occurs or a state exists
equ	equivalent	an equivalent concept
fmt	range	a range between two things
frm	origin	an initial state of a thing or a thing initially associated with the focused thing
gol	goal/final state	a final state of object or a thing finally associated with the object of an event
icl	included/a kind of	an upper concept or a more general concept
ins	instrument	the instrument to carry out an event
iof	an instance of	a class concept that an instance belongs to
man	manner	the way to carry out an event or characteristics of a state
met	method	the means to carry out an event
mod	modification	a thing that restricts a focused thing
nam	name	a name of a thing
obj	effected thing	a thing in focus that is directly effected by an event or state
opl	effected place	a place in focus affected by an event
or	disjunction	a disjunctive relation between two concepts
per	proportion, rate of distribution	a basis or unit of proportion, rate of distribution
plc	place	the place where an event occurs, or a state is true, or a thing exists
plf	initial place	the place where an event begins or a state becomes true
plt	final place	the place where an event ends or a state becomes false
pof	part-of	a concept of which a focused thing is a part
pos	possessor	the possessor of a thing
ptn	partner	an indispensable non-focused initiator of an action
pur	purpose or objective	the purpose or objective of an agent of an event or the purpose of a thing which exists
qua	quantity	the quantity of a thing or unit
rsn	reason	a reason why an event or a state happens
scn	scene	a scene where an event occurs, or state is true, or a thing exists
seq	sequence	a prior event or state of a focused event or state
src	source/initial state	the initial state of an object or thing initially associated with the object of an event
tim	time	the time an event occurs or a state is true
tmf	initial time	the time an event starts or a state becomes true
tmt	final time	the time an event ends or a state becomes false
to	destination	a final state of a thing or a final thing (destination) associated with the focused thing
via	intermediate place or state	an intermediate place or state of an event

Appendix 3: List of Attribute Labels

© Copyright UNL Center of UNDL Foundation. All rights reserved.