

Universal Networking Language Specification

relations

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The Universal Networking Language (UNL) is a metalanguage for describing conceptual relations between the Universal Words (UWs) expressed in sentences. Each relation between UWs is represented as a three-element unit (relation-node1-node2) called a “link”; more complex relations are represented as a set of links.

There are labels for two classes of links between Universal Words:

- 1) Sentential relations;
- 2) Knowledge-base relations;

Sentential relations are those that appear between the elements of a sentence. Knowledge-base relations are those that hold between UWs in the knowledge base. The specifications below are based on a conceptual hierarchy whose top-most nodes are: thing, place, time, state, event and manner. Consequently, the definitions are given in terms of these types of concepts. Below, “concept” denotes any of these types.

Link labels for Sentential relations

agt Agent. The relation between a thing which initiates an action and the action. An action is a change over time that can often depend on the agent’s volition.

Template: agt ([action], [thing])

Reading: agent of [action] is [thing]

Example:

English: A rabbit ran.

UNL: agt (run, rabbit)

English: A dog eat foods.

UNL: agt (eat, dog)

Compare with: **cau** (for other non-volitional events)

and Conjunction. The conjunctive relation between concepts which together constitute all of a set.

Template: and ([concept], [prior concept])

Reading: [concept] and [prior concept]

Example:

English: beautiful tulips and roses

UNL: and:01 (rose, tulip)

mod (beautiful, :01)

Compare with: **or** (for disjunction)

enu (for subsets)

aoj Attribute Object. The relation between a thing and its states.

Template: aoj ([state], [thing])

Reading: attribute object of [state] is [thing]

Example:

English: the leaves are green

UNL: aoj (green, leaf)

English: I am a teacher

UNL: aoj (teacher, I)

Compare with: **mod** (for attributes of things¹, places and times)

man (for manners of states or events)

bas Basis or standard of comparison. The relation between a concept and its states, when cited as a basis for describing another's. Comparatives and similes are common examples.

Template: bas ([state], [concept])

Reading: basis or standard of comparison of [state] is [concept]

Example:

English: A cat is bigger than a rat

¹ Note that UNL offers two ways of representing relations between things and their attributes: **aoj** and **mod**. We prefer **aoj** for predicative structures such as “the leaves are green” and **mod** for structures such as “the green leaves”. The system, however, works with both.

UNL: bas (big, rat)
 aoj (cat, big)
 English: eyes like stars
 UNL: bas (like, star)
 aoj (eye, like)
 English: A is same as B.
 UNL: bas(same, B)
 aoj(same, A)

The size of a rat is used as a standard of comparison for characterizing the size of a cat; the characteristics of stars are the basis for characterizing the eyes.

ben Beneficiary (Indirectly affected person). The relation between an event and a human that is affected indirectly, as a side-effect of the event; it is neither agent nor object of the event.

(iap)

Template: ben ([event], [human])

Reading: beneficiary of [event] is [human]

Example:

English: His mother died on him.

UNL: ben (die, him)
 obj (die, mother)

Spanish: Se **le** murió su mamá.

Japanese: **Kare wa** haha ni shinareta.

English: to work hard for family

UNL: ben (work, family)
 man (work, hard)

English: It is a present for me.

UNL: ben (present, I)
 aoj (present, it)

Compare with: **obj** (for the object directly affected by the event)
pur (for events)

cag Co-agent. The relation between an action and the thing which initiates it together with the agent.

Template: cag ([event], [thing])

Reading: co-agent of [event] is [thing]

Example:

English: to walk with a friend.

UNL: cag (walk, friend)

Compare with: **agt** (for the agent alone)

cau Cause. The relation between a thing, place or time which initiates a non-volitional event and the event. A non-volitional event is a change over time that cannot depend on the agent's volition.

Template: cau ([non-volitional event], [thing, place or time])

Reading: cause of [non-volitional event] is [thing, place or time]

Example:

English: the InterNet forced changes...

UNL: cau (InterNet, force)

obj (force, change)

English: He died of tuberculosis.

UNL: cau (die, tuberculosis)

obj (die, he)

Compare with: **agt** (for action)

con (for events as "causes")

cnt Content. The relation of equivalence between two concepts.

Template: cnt ([concept or name], [concept])

Reading: content of [concept or name] is [concept]

Example:

English: UNL, the Universal Networking Language, is ...

UNL: cnt (UNL, Universal Networking Language)

English: John arrived, that is, he bought a ticket and...

UNL: cnt (arrive, buy)

obj (arrive, John)

obj (buy, ticket)

agt (buy, John)

and (buy, ...)

English: A language generator "deconvertor" is prepared for each language.

UNL: cnt (generator, "")

cnt ("", deconvertor)

English: The fact that he went there.

UNL: cnt (fact, go)

agt (go, he)

...

Compare with: **equ** (a knowledge-base relation of synonymy)

con Condition. The relation between events and states when one event or state which is seen as necessary for another event or state to occur.

Template: con ([focussed event or state], [conditioning event or state])

Reading: condition of [focussed event or state] is [conditioning event or state]

Example:

English: to return home because of the rain.

UNL: con (return, rain)

gol (return, home)

Compare with: **cau** (for things, places and times)

agt (for things)

coo Co-occurrence. The relation between events or states that occur simultaneously.

Template: coo ([focussed event or state], [co-occurrence event or state])

Reading: [focussed event or state] co-occurs with [co-occurrence event or state]

Example:

English: to return home thinking

UNL: coo (return, thinking)

gol (return, home)

Compare with: **seq** (for ordered events)

dur Duration. The relation between an event or state and the period of time during which it occurred.

Template: dur ([event or state], [period of time])

Reading: duration of [event or state] is [period of time]

Example:

English: to work nine hours.

UNL: dur (work, hours)
qua (hours, nine)
Compare with: **tim** (for the time at which an event or state occurred)

enu Enumeration. The relation between sister elements that form only a part of some set.

Template: enu ([concept], [prior concept])

Reading: [concept] and [prior concept]

Example:

English: Tennis and baseball are sports

UNL: enu:01 (tennis, baseball)

aoj (sports, :01)

Compare with: **and** (for elements that form a whole set)

fmt From-to. The relation between two concepts that define a range but are not explicitly related by an event.

Template: fmt ([range-final concept], [range-initial concept])

Reading: from [range-initial concept] to [range-final concept]

Example:

English: a ticket from Tokyo to Kyoto

UNL: fmt:01(Kyoto, Tokyo)

mod (ticket, :01)

Compare with: **src** (for events)

gol (for events)

gol Goal. The relation between a directed event and the final time, place or state associated with it. This includes what have been called “recipients”.

Template: gol([directed event], [final time, state, place])

Reading: goal of [directed event] is [final time, state, place]

Example:

English: go to London

UNL: gol (go, London)

English: give Susan a book

UNL: gol (give, Susan)

English: tell Mary a message
 UNL: gol (tell, Mary)
 English: convert water into steam
 UNL: obj (convert, water)
 gol (convert, steam)
 English: become a general
 UNL: gol (become, general)
 Compare with: **src** (for initial place)
 fmt (for place s not related by an event)

ins Instrument. The relation between an action and a concrete thing used by the agent to initiate the action.

Template: ins ([action], [concrete thing])

Reading: instrument of [action] is [concrete thing]

Example:

English: to cut the cheese with a knife

UNL: ins (cut, knife)

obj (cut, cheese)

Compare with: **met** (for abstract things or events)

lpl Logical place. The relation between an event and the logical or metaphorical place where it occurs.

Template: lpl ([event], [logical place])

Reading: logical place of [event] is [logical place]

Example:

English: Information flows in society.

UNL: lpl (flow, society)

obj (flow, information)

Compare with: **ppl** (for physical place)

man Manner. The relation between an event or state and a state or manner.

Template: man ([event or state], [state or manner])

Reading: manner of [event or state] is [state or manner]

Example:

English: to translate quickly

UNL: man (translate, quickly)

English: very quick

UNL: man (quick, very)

Compare with: **met** (for other modifications of events)

met Method. The relation between an action and the events and abstract things used by the agent to initiate it.

Template: met ([action], [abstract thing])

Reading: method of [action] is [abstract thing]

Example:

English: to cure by surgery

UNL: met (cure, surgery)

English: go there on foot

UNL: met (go, foot)

Compare with: **ins** (for concrete things)

mod Modifier. The relation between a concept and a thing, place, time that characterizes it.

Template: mod ([thing, place, time], [concept])

Reading: [thing, place, time] is modified by [concept]

Example:

English: the third man

UNL: mod (man, third)

English: the green leaves

UNL: mod (leaf, green)

English: my houses

UNL: mod (house, I)

Compare with: **aob** (for modifying only a thing)

man (for modifying only an event)

obj Object. The relation between an event and the thing modified or produced by the event.

Template: obj ([event], [thing])

Reading: object of [event] is [thing]

Example:

English: to eat an apple

UNL: obj (eat, apple)

English: Snow melts.

UNL: obj (melt, snow)

Compare with: **ben** (for person indirectly affected by the event)

opl Objectified place. The relation between an event and a place that is expressed as an object (often a direct object).

Template: opl ([event], [place])

Reading: objectified place of [event] is [place]

Example:

English: to walk the streets in Tokyo

UNL: opl (walk, street)

ppl (walk, Tokyo)

mod (streets, Tokyo)

English: cut the paper in the middle

UNL: opl (cut, middle)

obj (cut, paper)

English: pat him on the sholder

UNL: opl (pat, sholder)

obj (pat, he)

Compare with: **man** (for other modification of the event)

lpl (for logical place)

ppl (for physical place)

or Disjunction. The disjunctive relation between two concepts.

Template: or ([concept], [prior concept])

Reading: [concept] or [prior concept]

Example:

English: to have a cat or a dog

UNL: or:01 (dog, cat)

obj (have, :01)

Compare with: **and** (for conjunction)

per Per. The relation between two things that express manner of distribution or rate.

Template: per ([thing], [thing as a unit])

Reading: [thing] per [thing as a unit]

Example:

English: two pages per day (=two pages a day)

UNL: per (page, day)

qua (page, two)

English: two persons per room (=two person to a room)

UNL: per (person, room)

qua (person, two)

Compare with: **qua** (for numbers)

pof Part-of. The relation between a whole and its parts; used for things, places, times, states and manners, not for events.

Template: pof ([part-concept], [whole-concept])

Reading: [part-concept] is a part of [whole-concept]

Example:

English: the foot of the bed

UNL: pof (bed, foot)

English: my brain

UNL: pof (brain, I)

Compare with: **mod** (for other kinds of modification)

met (for parts of events)

ppl Physical place. The relation between an event or state and the physical place where it occurs.

Template: ppl ([event or state], [physical place])

Reading: physical place of [event or state] is [physical place]

Example:

English: to play in the garden

UNL: ppl (play, garden)

Compare with: **lpl** (for logical place)
opl (for place expressed as an object)

ptn Partner. The relation between an event and the agent of a counter-event which requires symmetrical cooperation.

Template: ptn ([event], [thing])

Reading: partner of [event] is [thing]

Example:

English: to compete with a friend

UNL: ptn (compete, friend)

Compare with: **agt** (for the main agent)
cag (for a second main agent)

pur Purpose. The relation between an event and the concept expressing the agent's purpose in initiating it.

Template: pur ([concept], [event or thing])

Reading: the purpose of [concept] is [event or thing]

Example:

English: come to see me

UNL: pur (come, see)

obj (see, me)

English: the budget for R&D

UNL: pur (budget, R&D)

English: work hard for money

UNL: pur (work, money)

Compare with: **gol** (for the final state of the event)
ben (for the human)

qua Quantity. The relation between a thing or unit and a quantifying expression.

Template: qua ([thing or unit], [quantifier])

Reading: quantity of [thing or unit] is [quantifier]

Example:

English: three kilos of apples

UNL: qua (kilo, three)
qua (apples, kilo)
Compare with: **per** (for units)
mod (for other kinds of modification)

seq Sequence. The relation between sequentially ordered events.

Template: seq ([focussed event], [prior event])

Reading: [focussed event] occurs after [prior event]

Example:

English: to go to the library and buy some books

UNL: seq (buy, go)
gol (go, library)
obj (buy, book)

Compare with: **coo** (for simultaneous events)

smd Non-semantic apposition. A relation between two juxtaposed concepts that is not related to their

(nsa) content. The order in the surface structure is kept in the argument position.

Template: smd ([concept], [prior concept])

Reading: [concept] follows [prior concept]

Example:

English: 2.5 Relations

UNL: smd (relations, "2.5")

src Source. The relation between an event and the initial time, place or state associated with it.

Template: src ([event], [time, place or state])

Reading: source of [event] is [time, place or state]

Example:

English: to come from London

UNL: src (come, London)

Compare with: **gol** (for final state)
man (for other kinds of modification)

tim Time. The relation between an event or state and the time at which it occurs.

Template: tim ([event or state], [time])

Reading: [event] occurs at [time]

Example:

English: to eat at noon

UNL: tim (eat, noon)

Compare with: **tmf** (for the time of the beginning of the event)

tmt (for the time of the end of the event)

tmf Time-from. The relation between an event or state and the time at which it begins.

Template: tmf ([event or state], [time])

Reading: [event or state] begins at [time]

Example:

English: to work from noon

UNL: tmf (work, noon)

Compare with: **tim** (for the time of the event)

tmt (for the time of the end of the event)

tmt Time-to. The relation between an event or state and the time at which it ends.

Template: tmt ([event or state], [time])

Reading: [event or state] ends at [time]

Example:

English: to work until noon

UNL: tmt (work, noon)

Compare with: **tmf** (for the time of the beginning of the event)

tim (for the time of the event)

via Via. The relation between a directed event and the place marking the path or trajectory of the agent or object during the event.

Template: via ([directed event], [place])

Example:

English: to fly to Tokyo via Shanghai

UNL: via (fly, Shanghai)
Compare with: **ppl** (for the place of the event)
mod (for other kinds of modification)

Link labels for Knowledge-base relations

The following labels are for links between UWs within the knowledge base, rather than within the sentence. In addition, the sentential relation labels can be used to further characterize UWs.

ant Antonym. The relation between a concept and another concept with opposite meaning.

Template: ant ([concept], [apposite concept])

Example: ant (good, bad)

equ Synonym. The relation between a concept and another concept with the same meaning.

Template: equ ([concept], [equal concept])

Example: equ (good, bad)

fld Semantic field. The relation between a concept and another concept which denotes the semantic field in which it is to be interpreted.

Template: fld ([concept], [field-concept])

Example: fld (hit, baseball)

icl Inclusion. The relation between a concept and another concept of which it is a proper subset.

Template: icl ([subset-concept], [set-concept])

Example: icl (dog, animal)