A Gift for a Millennium

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The United Nations University is an autonomous academic institute which was established by the United Nations General Assembly in 1975. The University carries out works on the pressing global problems of human survival development and welfare through a network of research and postgraduate training centers and cooperating institutions in both industrialized and developing countries. Established in 1995, the UNU/Institute of Advanced studies (UNU/IAS) is an advanced research and education institution with a flexible and multi-thematic programme orientation concerned with the interactions of social and natural systems. For the initial years, the UNU/IAS programme is directed at sustainable development issues. To this end, the UNU/IAS is currently active in the following relevant areas of research and education: Eco-restructuring for Sustainable Development; Megacities and Urban Development; Multilateralism and Governance; and Science, Technology and Society.

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Inside the cover: The United Nations University Headquaters in Tokyo.

Introduction : Invitation to a Global Solidarity Endeavor

Sharing information and providing a common educational environment for all is and often-stated ideal. Language is an essential factor for this. Sharing of information among countries is a crucial part of the work of international organizations such as the United Nations, UNESCO, EU, and many others. These organizations are be concerned about providing equal opportunities to all members states, Many nations, however, have much less opportunities to learn about the activities of the international organizations, despite the great significance of these activities for them. At present, most information materials, scientific, technical and educational, are written in English or in few other languages. While this

benefits millions of people, millions more are denied access to these information materials because they do not speak the required languages.

The smoothest way to communicate with other people and obtain information and education, is in one's own mother language. Smooth communication among people with defferent language will improve mutual understanding.

For this purpose, we are introducing the UNL. UNL will provide a common communication environment for diffrent language. Furthermore, UNL will expand education and business opportunities around the world, Mutual understanding among defferent cultures is one of the ultimate goals of UNL.

The UNL of still at an early stage, but the infrastructure and the architectural design is available for a collaborative work of scholars, developers and providers from any language. The development of the UNL offers a unique opportunity for a genuine global slidarity endeavor. Our common well-defined purpose os working together for a goal tha is beneficial to all. To acieveit, depends on the vast intellectual resources available in all languages. This is an invitaion for universal win-win collaboration that meets the ideals of the UN, UNESCO, EU, and many other international organizations that care about equal opportunities for all peoples. It is a call for a global partnership for a very targeted, attainable, tangible and long-lasting communication facility.

The UNU/IAS will provide the means to accomplish such an ambitious collaborative win-win endeavor. Starting in January year 2000, the UNL resources will be made available to all those who are interested in joining the collective task. The UNL resources will be proveded free of charge. This is and invitation to undertake a collaborative research and development to offer all peoples of the world a gift for a millennium.

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Tokyo, November 1999

Preface : Acknowledgements

Launching a major endeavor such as the UNL requires the combined knowledge and talent of many people. Behind these people, there are a number of research institutions and traditional universities. In introducing this ambitious initiative to the public, and bringing the Specifications of the UNL system into the open, I would like to acknowledge the value of years of scientific research. I would like to thank the research teams for their highly motivated commitment. The following institutions joined the UNL initiative as partners in the first hour, in November 1996.

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A special Task Force on the UNL Specifications met several times before consolidating the first version of the Specifications that are presented in this edition. The Task Force included: Hiroshi Uchida (UNL Center, head of Task Force), Pushpak Bhattacharyya (UNL-India), Christian Boitet (UNL-France), Igor Boguslavsky (UNL-Moscow, Russia), Christian Boitet (UNL-France), Mike Dillinger (UNL-Brazil), David Escorial (UNL-Spain), Daoud Maher (UNL-Jordan), Luis Iraola Moreno (UNL-Spain), Irina Prodanof (UNL-Italy), Jorge Sch"utz (UNL-Germany), Virach Sornlertlamvanich (UNL-Thailand), Oliver Streiter (UNL-Germany), M. Tomokiyo (UNL, France), Meiying Zhu (UNL Center).

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Tarcisio G. Della Senta
Director UNU/IAS
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1. Global Internet Infrastrucutures

Only a few scientists and government officials could use a small text-base computer network in early 1980. An estimated 150 million Internet users worldwide are supported by interconnected networks in 1999.

The growing Internet infrastructures are dramatically changing society, business and individual life styles. Electronic mail has become a popular communication facility, ranking with telephone. Thanks to the Internet, the e-mail has become a new fashion in human relations. Shopping malls on the Internet are jammed with customers. In the stock market, many investors perform transactions through the Internet. These communication facilities could not be imagined just a few years ago.

1.1. Expansion of Internet Infrastructures

In the '99, more than 97% of all Internet hosts were in developed countries, corresponding to only 16% of the world population. The international structure of the Internet has been US-centric. Moves toward expanding international Internet networks, however, are growing

in each region of the globe. The European Internet infrastructure has become interconnected with high-capacity bandwidth. Asian countries began to investigate the conditions to form an intra-Asia network. Such moves will change Internet infrastructure dramatically over a short period.

In developing countries, one common problem is the high cost of Internet services and its physical setup. Wireless local networks are often mentioned as the most economical and feasible solution to the severe shortage of communication infrastructure in these countries. Further more, optoelectronic technology and optical networking will become the key enablers of the future communications infrastructure by eliminating the severe restrictions imposed by traditional communication systems.

As network technologies have been improving and expanding, the Internet began to spread throughout many nations. In some countries, it is maintained under the control of central governments. In most countries, however, the Internet is growing boosted by open competition and market forces. Although the Internet structure has been initially US-centric, regional and local networks are worldwide interlinked. Internet infrastructures of the next generation have been strengthened with governmental support, market demand, and state-of-the-art technologies.

1.2. The Reshaping Community Boundaries Worldwide

Fostered by the growth of Internet, information networks are transforming the world communications scenario. In the past, these networks were used primarily to carry electronic mail. Initially, networks such as ARPA-NET were used by university researchers to exchange scientific data. Companies then began to use these networks, not only for their internal communications, but also for communicating with other companies, thus creating a common working environment, which became a necessary part of the way of doing business. They now include content services, on-line shopping, and others services that, so far, have been provided through Value Added Networks (VANs). Next, the networks entered family homes, where they are used for recreational and domestic purposes. The global village is becoming more interconnected, and community boundaries are being re-defined.

Today, the Internet is providing a larger platform for communication among people across national frontiers. Individuals send their information to the world independently of the traditional mass media. Product developers can sell their products to end-users without salesman and stores. People can download their desired books from digital libraries in the world from their home. They can read digital newspapers using information filtered on their computer. New forms of relationships are been established among people who have never met each other. Certainly, the Internet has broken various barriers in communication. The remaining barriers that subsist are between different languages. Although demand for e-mail applications is still large, the uses of the Internet are becoming more diverse.

As networks are expanding around the world, and as the physical barriers to their development are surmounted, the language barriers will increase in prominence. Even now, a flood of information is provided through the networks, written in a number of languages. But, the language barrier hinders access to this information. Most of the information in the world is written in the author's mother tongue. There is relatively little information written for multiple languages readers. Information for worldwide use is often written in English or in

a few other well disseminated languages. The United Nations and other international organizations produce their documentation in 6 officials languages: Arabic, Chinese, English, French, Russian and Spanish. For millions of people, however, whose mother tongue is not one of these languages, it is difficult to take full advantage of the information produced by these organizations. Conversely, information that is not written in one of the dominant languages is seldom made available in these six languages, much less in others.

2. Breaking down the Language Barrier

In this century, English is regarded as the most common communication language worldwide. Non-English speakers spend money and time to learn it. Nevertheless, they hardly ever acquire perfect English as a native speaker. Thus, they remain somewhat handicapped in communicating in English. In addition, English itself does not reach billions of people because they do not have the resources for learning it. Hence, although English has become popular in business, entertainment, science and government related matters, a communication gap persists for non-English speakers.

To make things worse, the reverse is also true: a gap exists between English speakers and the information and culture in other peoples. They have little chance to have access to languages, such as, Chinese, Hindi, Japanese, Arabic, and many other cultural and otherwise rich languages.

In order to overcome the language barrier, many attempts have been made in the past. In the colonization era, metropolitan powers forced language education in colonized territories. Local people had to learn foreign languages in order to survive and develop. Several major languages spread worldwide in that era, Spanish, Portuguese, French, English and others. Many nations in these territories lost their traditional culture, their own language, and with that, their identity. A language is the basis for culture and social identity. Every language is a "local" language. To communicate with others, people have to learn the other language. Esperanto was the first attempt at intermediating communication among local languages and becoming a world common language. It was accepted by only a few people because it is just one local language itself.

Professional translators have been bridging such a communication gap. The quantity of translation by humans, however, is rather small as compared to the required communication needs among different languages. The main reason for such a limitation is high costs. In addition, the number of translators for minor languages is rather small. Translation by human, thus, has its limitation in terms of cost and human resources.

Since the first electronic computer was developed in 1946, many hoped that human intelligence could produce translation through machines. Translations with computers emerged as an interesting research theme. Georgetown University and IBM demonstrated a small computer translation system between Russian and English in the early 1960's. Since then, there is a long history of research on computer translation. Some companies developed commercial computer translation systems that are available on PC.

2.1. Computer Translation Systems

Computer translation systems made significant progress. Some of them are now being incorporated in network browsers. The demand for these systems indicates how large the

language problem is among Internet users. Computer translation system are useful under limited conditions. For instance, the user can evaluate and modify a translated documented in one's own language, but seldom in the other language. However, after translating with a computer, the user has to work to edit the output document. In addition, it would require language knowledge to edit the translation of the document in the other language. In sending information throughout the world, the sender normally does not know the language of the recipient. In this case, the sender is bound to use a computer translation system blindly, because he can't check whether the translated results are correct or not. This is a serious limitation in current computer translation systems, and explains, in part, their limited acceptance.

The difficulty in these translation systems lies in the language analysis process to be performed by the computer. In analyzing a sentence in its semantic representation, the computer has to discriminate the lexical and syntactic ambiguities, and then, derive the correct semantic representation. There are many problems to be solved in these processes. On the other hand, a language synthesis from the semantic representation also has a few problems, although some of the most difficult ones are related to the generation of elegant sentences.

This situation will change dramatically with the UNL.

2.2. A Breakingthrough with UNL

UNL is an electronic language for computers. It intermediates understanding among different natural languages. UNL represents sentences in the form of logical expressions, without ambiguity. These expressions are not for humans to read, but for computers. It would be hard for users to understand, and they would not need to, unless they are UNL experts. Thus, UNL is an intermediate language to be used through the Internet, which allows communication among people of different languages using their mother tongue.

Adding UNL to the network platforms will change the existing communication landscape. The purpose of introducing UNL in communication networks is to achieve accurate exchange of information between different languages. Information has to be readable and understandable by users. Information expressed in UNL can be converted into the user's native language with higher quality and fewer mistakes than the computer translation systems. In addition, UNL, unlike natural language, is free from ambiguities.

2.3. UNL: a Unique Opportunity for All

Sharing information and providing a common educational environment for all is an often-stated ideal. Language is an essential factor for this. At present, however, most information, scientific and educational materials are written in English or in few other languages. This benefits millions of people. Yet, non speakers of these languages have to learn them to access these materials. However, it would be rather smoother to get education in one's own mother language.

Sharing of information among countries is a crucial part of the work of international organizations such as the United Nations and UNESCO. The staff working in these organizations are concerned about all peoples of the world. But these have few opportunities to learn about the activities of the international organizations, despite the great significance

of these activities for them. One of the reasons for this lack of information is the language barrier.

Providing equal economic opportunities is essential for business. Economic interaction among countries has increased with the globalization of the economy. A crisis in Asia shook the economies all over the world. In business, it is important to quickly know what is happening worldwide. Today, various kinds of customers from different languages are accessing Internet shops. These Internet shops would have great advantage in preparing information in many languages at once. Customers also can freely access various web-pages worldwide to buy different goods. They can read web-pages written in different languages in their own.

UNL will provide a common educational environment to different languages. Furthermore, UNL will expand business opportunities immensely around the world. Mutual understanding among different cultures is one of the ultimate goals of UNL. Smooth communication through UNL among people with different languages will support and improve mutual understanding. UNL will provide a common educational environment to different languages.

3. UNL -The Universal Networking Language-

The Universal Networking Language (UNL) is an electronic language for computers to express and exchange every kind of information. The UNL represents information, i.e. meaning, sentence by sentence. Sentence information is represented as a hyper-graph having concepts as nodes and relations as arcs. This hyper-graph is also represented as a set of directed binary relations, each between two of the concepts present in the sentence. Concepts are represented as character-strings called "Universal Words (UWs)". UWs can be annotated with attributes which provide further information about how the concept is being used in the specific sentence. A UNL document, then, will be a long list of relations between concepts.

3.1. UNL Expression

Binary relations are the building blocks of UNL expressions. They are made up of a relation and two UWs. This section deals with the definition and interpretation of the relations that are used as the basis of the UNL. The relations between UWs in binary relations have different labels according to the different roles they play. These Relation-Labels are listed and defined below.

3.1.1. Internal Structure of Binary Relations

Binary relations are made up as follows:

<Binary relation>::=<Relational Label>[":"<Compound
UW-ID>]
"("{<UW1>|":"<Compound
UW-ID1>}","{<UW2>|
":"<Compound UW-ID2>}")"

These elements will be defined in the paragraphs below.

Example binary relations are:

mod:01(area(icl>place):02.@indef, strategic)
obj(designate(icl>do).@entry.@may, :01)
plc(read(icl>do), home)

Meta-symbols for description:

< > non-technical symbol / variable
" " enclosed string is literal characters
::= ... is defined as ...
| disjunction,"or"
[ ] optional element
{ } alternative element
{ }... to be repeated more than zero times

1) Relation-Labels

Relation-labels are strings of three lower-case alphabetic characters taken from the closed inventory listed below. Examples are the elements in bold face type below:

mod:01(area(icl>place):02.@indef, strategic)
obj(designate(icl>do).@entry.@may, :01)
plc(read(icl>do), home)

2) Compound UW-IDs

Compound UW-IDs are strings of two upper-case alphabetic characters and digits used to identify each instance specified by Compound UWs. Compound Uws are groups of binary relations(called "Hyper-Nodes") so that they can be referred to as an UW. Examples are the elements in bold face type below. The first example is an instance of compound UW-IDs being used to define a unit; the second example is an instance of Compound UW-IDs being used to cite or refer to a Compound UW previously defined. See Compound UWs for further information.

mod:01(area(icl>place):02.@indef, strategic)
obj(designate(icl>do).@entry.@may,:01)
plc(read(icl>do), home)

Note that the ":02" in the first example is not a Compound UW-ID but an UW-ID. A Compound UW-ID is either attached directly to Relation-Labels or appears alone, as UWs. See UW-IDs for further information.

3) UWs

UWs can be UWs or compound UWs. Examples are the six elements in bold face type below. Non-standard formatting has been used to make them clearer.

mod:01(area(icl>place):02.@indef, strategic)
plc(read(icl>do), home(icl>place))
obj(designate(icl>do).@entry.@may,:01)

3.1.2. Format of UNL

1) UNL Document

The structure of a UNL document is expressed using the following tags.

[D]	Beginning of document
[/D]	End of document
[P]	Beginning of paragraph
[/P]	End of paragraph
[S]	Beginning of sentence
[/S]	End of sentence

UNL documents are generally constructed in the following manner.

[D]	Beginning of document
[P]	Beginning of paragraph
[S]	Beginning of sentence
...	UNL expressions
[/S]	End of sentence
...	Repetition of [S]...[/S]
[/P]	End of paragraph
...	Repetition of [P]...[/P]
[/D]	End of document
...	Repetition of [D]...[/D]

2) UNL Expression

UNL expression is identified with the following tags:

{unl}	Beginning of UNL expression
{/unl}	End of UNL expression

There are two kinds of UNL expression, one is table form and another is list form. Table form of UNL expression is more readable than list form, but list form of UNL expression is more compact than table form. In UNL expression, there are three types of information, such as binary relations, UWs, and encoded binary relations. The following tags are used to distinguish this information.

[W]	Beginning of UW set
[/W]	End of UW set
[R]	Beginning of binary relations
[/R]	End of binary relations

<Binary
Relation> <Relation Label>
::= [":"<Compound UW-ID>]
"(" {<UW1>] | ":"
<Compound UW-ID1>}

","
{<UW2>] |":"
<Compound UW-ID2>}
")"

<UW> ::= <Head Word>
[<Constraint List>] [
":" <UW-ID>] [
"." <Attribute List>]

<Encoded Binary
Relation> := {<UW-ID>
| <Compound UW-
ID>}
<Relation Label> [":"
<Compound UW-ID>]
{<UW-ID> | <Compound
UW-ID>}

3) Table form of UNL expression

The table form of UNL expression consists of binary relations or only one UW. :

{unl}
<Binary Relation> ...
{/unl}

or

{unl}
[W]
<UW>
[/W]
{/unl}

4) List form of UNL expression

The list form of UNL expression consists of UWs and encoded binary relations.

{unl}
[W]
...
[/W]
[R]
...
[/R]
{/unl}

Each tag, binary relation, UW, and encoded binary relation should be separated with carriage return (0x0a, or 0x0d 0x0a).

Sample of UNL expression in list form.

Ex.1) Monkey eats bananas.

```
[S]
{unl}
[W]
eat(icl>do).@present.@entry:00
monkey(icl>animal).@generic:01
banana(icl>food).@generic:02
[/W]
[R]
00agt01
00obj02
[/R]
[/S]
```

Ex.2) UNL is a common language that would be used for network communications.

```
[S]
{unl}
[W]
language(icl>abstract thing).@present.@entry:00
UNL(icl>language).@topic:01
common(aoj>thing):02
use(icl>do).@present:03
language(icl>abstract thing).@present.@entry:04
communication(icl>action).@pl:05
network(icl>thing):06
[/W]

[R]
00aoj01
00mod02
03obj04
03pur05
05mod06
[/R]
[/S]
```

3.2. Universal Words

A UW(Universal Word) represents simple or compound concepts. There are two classes of UWs:

* simple, unit concepts called "UWs" (Universal Words).
  and
* compound structures of binary relations grouped together and called "Compound UWs".

These are indicated with Compound UW-IDs, as described below.

3.2.1. Syntax of UW

UWs are made up of a character string (an English-language word) followed by a list of constraints and a list of attributes. These can also be followed by an Instance ID. The meaning and function of each of these parts is described in the next section, on Interpretation. The following expressions provide a more formal statement of the syntax of UWs.

<UW> ::= <Head Word> [<Constraint List>] [":" <IUW-ID>] [
"." <Attribute List>]
<Head Word> ::= <character>...
<Constraint List> ::= "(" <Constraint> [","
<Constraint>]... ")"
<Attribute List> ::= <Attribute Label> ["."]...

<UW-ID> ::= {<upper case alphabetical character>
|<digit>}
{<upper case alphabetical character>
|<digit>}
<Constraint> ::= <Relation Label> { ">" | "<" } <UW>
[<Constraint List>] |
<Relation Label> { "<" | ">" } <UW> [<Constraint List>]
[{ ">" | "<" } <UW> [<Constraint List>]] ...
<Attribute Label> ::= "@volitional" | "@reason" | "@past"
| ....
<Relation Label> ::= "agt" | and" | "aoj" | "obj" | "icl" | ...
<digit> ::= 0 | 1 | 2 | ... | 9
<upper case alphabetical character> ::= "A" | ... | "Z"

<character> ::= "a" | ... | "z" | "_" | " " | "#" | "!" | "$" | "%" | "=" |
"^" | "~" | "|" |
"@" | "+" | "-" | "<" | ">" | "?" | "'"

1) Head Word

The Head Word 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. An 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.

2) 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", with no 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(icl>do,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. The restrictions of Restricted UWs, their Constraint Lists, are Constraints. The Constraints that use the Relation Labels defined above can be seen as an abbreviated notation for full binary relations: drink(icl>do,obj>liquid) is the same as obj(drink(icl>do),liquid) which means something like "cases of drinking where the "obj" is a liquid". Constraints can use Relation Labels. Each constraint in the Constraint List should be sorted in alphabetical order. When the relation label is omitted, it is assumed that the left most relation is omitted. For example, xxx(icl>change(icl>do)) can be replaced xxx(icl>change>do).

3) Attributes

The Constraint List can be followed by a list of attributes defined in Appendix 2, which provides information about how the concept is being used in a particular sentence.

4) UW ID

A UW can include an UW ID. The UW ID is simply used to indicate some referential information: that there are two different occurrences of the same concept (they are not co-referent). Normally, if the same UW occurs more than once, it is in all cases understood to refer to the same entity or occurrence. For example, if one man greeted another man, the same UW would be used twice Ñ "man(icl>person)" and we could distinguish one from the other with UW IDs:

man(icl>person):01 for the first and
man(icl>person):02 for the other, to make it clear that the first man did not greet himself.

3.2.2. Types of Uws

UWs, then, are character strings (words or expressions) that can be given specifications, attributes and Instance IDs. Their function in the UNL system is to represent simple concepts. The three types of UWs, in order of practical importance are:

* Basic UWs, which are bare Head Words with no Constraint List, for example:

go
take
house
state

* Restricted UWs, which are Head Words with a Constraint List, for example:

state(agt>person,obj>information)
state(equ>nation)
state(icl>situation)
state(icl>government)

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

ikebana(icl>action,obj>flowers)
samba(icl>dance)

soufle(icl>food,pof>egg)
murano(icl>glass,aoj>colorful)

1) Basic UWs

Basic UWs are character strings that correspond to an English word. A basic UW denotes all the concepts that may correspond to that in English. They are used to structure the knowledge base and as a fall-back method for establishing correspondences between different language words when more specific correspondences cannot be found.

2) Restricted UWs

Restricted UWs are by far the most important. Each Restricted UW denotes a subset of the concept that may correspond to that in English defined by its Constraint List. Each Restricted UW represents a more specific concept. Consider again the examples of Restricted UWs given above:

state(agt>person,obj>information) is more specific concept (arbitrarily associated with the English word "state") that denotes situations in which humans produce some information, or state something.

state(equ>nation) is more specific sense of "state" that denotes a nation.

state(icl>situation) is more specific sense of "state" that denotes a kind of situation.

state(icl>government) is 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, that is why these are called Restricted UWs. Informally, the restrictions mean "restrict your attention to this particular sense of the word". Thus, the focus is clearly the idea and not the specific English word. It often turns out that for a given language there is a wide variety of different words for these concepts and not, coincidentally, all the same word, as in English. Notice that by organizing these senses around the English words, we can simplify the task of making a new UW/Specific Language dictionary: we can use a bilingual English/Specific Language dictionary and proceed from there, specifying the number different concepts necessary for each English word. This, of course, does not mean that we're translating English words; we're just using the English dictionary to remind us of the concepts that we will want to deal with, and thus, to organize work more efficiently.

3) Extra UWs

Extra UWs denote concepts that are not found in English and that have to be introduced as extra categories. Foreign-language word are used as Head Words using English (Alphabetical) character. Consider again the examples given below:

ikebana(icl>activity, "something you do
obj>flower) with flowers"
samba(icl>dance) "a kind of dance"
souffle(icl>food, pof>egg) "a kind of food made with eggs"
murano(icl>glass, aoj>colorful) "a kind of colorful glass"

To the extent that these concepts exist for English speakers, they are expressed with foreign-language loanwords and don't always appear in English dictionaries. So, they simply have to be added if we are going to be able to use these specific concepts in the UNL system. Notice that the Constraint List or restrictions already give some idea of what concept is associated with these Extra UWs and the Constraints binary relation this concept to other concepts already present (activity, flower, egg, food, etc.).

4) Compund UWs

Compound UWs are a set of binary relations that are grouped together to express a concept . A sentence itself is considered a compound UW. This allows us to deal with situations like: [Women who wear big hats in movie theaters] should be asked to leave. Without Compound UWs, we wouldn't be able to build up complex ideas like "women who wear big hats in move theaters" and then relate them to other concepts.

Compound UWs are indicated by Compound UW-IDs, which are a colon ":" followed by two digits. Compound UW-IDs can also be followed by an AttributeList. More formally, their syntax can be described as follows:

<Compound UW> ::= ":" <Compound UW-ID> ["."<Attribute List>]

<Compound UW-ID> ::={<upper case alphabetical character>
|<digit>}
{<upper case alphabetical character>
|<digit>}
<Attribute List> ::= <Attribute Label> ["." <Attribute Label>]...
<Attribute Label> ::= "@imperative" | "@may" | "@past" | ...
<digit> ::= 0 | 1 | 2 | ... | 9
<upper case alphabetical character> ::= "A" | ... | "Z"

Compound UWs denote complex concepts that are to be interpreted as unit-concepts, understood as a whole so that we can talk about their parts all at the same time. Consider again the example given above. [Women who wear big hats in movie theaters] should be asked to leave. The example does not mean that [women] or [women who wear big hats] should be asked to leave. Only when we group the structure together and talk about it as a whole unit do we get the correct interpretation. Just as we can relate such complex units to other concepts with conceptual relations, we can attach Attributes to them to express, negation, speaker attitudes, etc. which are usually interpreted as modifying the main predicate within the Compound UW.

5) How do define Compound UWs

Compound UWs are 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(icl>do), woman(icl>person).@pl)
obj:01(wear(icl>do), hat(icl>thing))

aoj:01(big(aoj>thing), hat(icl>thing))
plc:01(wear(icl>do, theater(icl>place))
mod:01(theater(icl>place), movie(icl>thing))

After this group has been defined, wherever ":01" is used as an UW, it means that the UW should be understood as all of these Binary relations. 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.

6) How to cite Compound UWs

Once defined, Compound UWs can be cited or refered to by simply using the Compound UW-ID as an UW. To complete the example above, we could continue with:

agt(ask(icl>do).@should, :01)
obj(ask(icl>do), leave(icl>do))

Again, ":01" is interpreted as the whole set of binary relations defined above. Compound UWs can be cited within other Compound UWs.

3.3. Relations

In the UNL, binary relations are represented as less than three-character strings called "Relation-Labels". There are many factors to be considered in choosing an inventory of relations. The principles to choose relations as follows.

Principle 1) Necessary Condition
When an UW has relations between more than two other UWs, each relation label should be set as to be able to identify each relation on the premise that we have enough knowledge about a concept of each UW express.

Principle 2) Sufficient Condition
When there are relations between UWs, each relation label, we should be set as to be able to understand each role of each UW only by referring a relation label.

The UNL relations are defined as specified below.

agt (agent)

Agt defines a thing which initiates an action.

agt (do, thing)

Syntax

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

Detailed Definition

Agent is defined as the relation between:
UW1 - do, and
UW2 - a thing
where:

- EUW2 initiates UW1, or
- EUW2 is thought of as having a direct role in making UW1 happen.

Examples and readings
agt(break(icl>do), John(icl>person)) John breaks
agt(translate(icl>do), computer translates
computer(icl>machine)) ...
agt(run(icl>do), car(icl>thing)) car runs ...
agt(break(icl>do), explosion breaks
explosion(icl>event))...

Related Relations
Agent is different from cag in that agent initiates the action, whereas the co-agent initiates a different, accompanied action. Agent is different from ptn in that agent is the focussed initiator of the action, whereas the partner is a non-focussed initiator. Agent is different from con in that agent is the focussed initiator of the action, whereas condition is an indirect, usually unfocussed, influence on the action.

and(conjunction)

And defines a conjunctive relation between concepts.

and (*, *)

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

Detailed Definition
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(dream(icl>do), think(icl>do)) ... to think and to dream
and(Mary(icl>person),
John(icl>person)) ... John and Mary

Related Relations
Conjunction is different from or in that with and we group things together to say the same thing about both of them, whereas with or we separate them to say that what is true about one is not true about the other. Conjunction is different from cag in that when agents are conjoined both are initiating an explicit event, whereas with cag, the co-agent initiates an implicit event. Conjunction is different from ptn in that when agents and partners are conjoined both are in focus, whereas with ptn, the partner is not in focus (as compared to the agent). Conjunction is different from coo and seq in meaning, although many times the same expressions can be used for both. 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 or not they are considered to be grouped together. In turn, seq means that the terms are ordered in time, one after the other.

aoj (thing with attribute)

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

aoj ((aoj>thing), thing)
aoj (thing, thing)

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

Detailed Definition
Thing with attribute is defined as the relation between:
UW1 - a state or a thing which represents a state
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(icl>thing)) leaf is red
aoj(available(aoj>thing), book is
book(icl>thing)) available
aoj(nice(aoj>thing), ski(icl>event)) Skiiing is nice
aoj(teacher(icl>thing), John(icl>person)) John is a teacher
aoj(have(aoj>thing,obj>thing), I) I have a pen
obj(have(aoj>thing,obj>thing),
pen(icl>thing))
aoj(know(aoj>thing,obj>thing),
John(icl>person)) John knows ...
aoj(can(aoj>thing,obj>thing), I)I can ...
aoj:01(difficult(aoj>thing), it)It is difficult for John.
aoj(:01, John(icl>person))

Related Relations

Thing with attribute is different from mod in that mod gives some restriction, whereas aoj gives a state or characteristic. Thing with attribute is different from ben in that a beneficiary is quite independent from an focussed event or state but this event or state can be considered to give a good or bad influence, whereas aoj has more close relation and can be considered to describe a state or characteristic. Thing with attribute is different from obj in that obj gives a thing which is directly affected by action or phenomenon, whereas, aoj gives a thing in a state.

bas (basis for expressing degree)

Bas defines a thing used as the basis for expressing degree.

bas (degree, thing)

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

Detailed Definition
Basis is defined as the relation between:
UW1 - a degree, and
UW2 - a thing,
where:

- UW1 is a degree expressing similarity or difference, such as "more", "most", "less", "same", "similar", "like", "as much as", "at least" etc., and
- UW2 is some thing used as the basis for evaluating characteristics or quantity of some other (focussed) thing.

Examples and readings

bas(more, rat(icl>thing)) ...er than rat; more ... than rat
bas(like, star(icl>thing)) ... like star
bas(same, b(icl>thing)) ... the same as b
bas(at least, 12) ... the same as b
aoj(beautiful(aoj>thing), tulip is more
tulip(icl>thing)) beautiful than rose
man(beautiful(aoj>thing), more)
bas(more, rose(icl>thing))
aoj(:01, John(icl&t;person))John is more quiet than shy
man:01(quiet(aoj>thing), more)
bas:01(more, shy(aoj>thing))

ben (beneficiary)

Ben defines a not directly related beneficiary or victim of an event or state.

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

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

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

Examples and readings

ben(give(icl>do), Mary(icl>person))John give ... for Mary.
agt(give(icl>do), John(icl>person))
ben(good(aoj&g;thing), John) It is good for John to

Related Relations
Beneficiary is different from aoj in that aoj has close relation and can be considered to describe a state characteristic, whereas a beneficiary is quite independent from a focused event or state but this event or state can be considered to give a good or bad influence.

cag (co-agent)

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

cag (do, thing)

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

Detailed Definition
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(icl>do), John(icl>person))... walk with John
cag(live(icl>do),aunt(icl>person)) ... lives with aunt

Related Relations

Co-agent is different from agt in that different, independent actions occur for the agent and the co-agent. Moreover, the agent and its action are in focus, while the co-agent and its action are not in focus. Co-agent is different from the ptn in that the co-agent initiates an action that is independent of the agent's action, whereas the partner initiates the same action together with the agent. Co-agent is different from con in that the co-agent initiates a non-focused action, whereas the condition is an indirect influence on the focused action.

cao (co-thing with attribute)

Cao defines a thing not in focus as in a state in parallel.

cao ((aoj>thing), thing)
cao (thing, thing)

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

Detailed Definition
Co-thing with attribute is defined as the relation between:
UW1 - a state or a thing which represent a state
UW2 - a thing,
where:
- There is an implicit state that is independent of, but accompanies, UW1, and
- UW2 is in an implicit state, or
- UW2 is associated with an implicit state.

Examples and readings
cao(exist(aoj>thing), you) ... is here with you

Related Relations
Co-thing with attribute is different from aoj in that there is a different, independent state for the thing with attribute and co-thing with attribute respectively.

cnt (content)

Cnt defines an equivalent concept.

cnt (thing, thing)

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

Detailed Definition
Content is defined as the relation between:
UW1 - a thing, and
UW2 - a thing,

where:

- UW2 is a content or explanation of UW1

Examples and readings
cnt(unl(icl>language),
universal networking language(icl>language) UNL, Universal Networking Language
cnt(internet(icl>network), amalgamation(icl>thing)) Internet: an amalgamation
cnt(language generator(icl>tool),
deconvertor(icl>tool).@double_quotation) a language generator "deconvertor"...

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 (occur, thing)
cob (do, thing)
cob ((aoj>thing,obj>thing), thing)

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

Detailed Definition
"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(icl>occur), Mary(icl>person)) ... died with Mary
cob(have(aoj>thing,obj>thing), ... have a pen
pencil(icl>thing)) with a pencil
obj(have(aoj>thing,obj>thing),
pen(icl>thing))

Related relarions
Co-object is different from obj in that the obj is in focus, whereas the cob is related to a second, non-focused implicit event or state.

con (condition)

Con defines a non-focused event or state which conditioned a focused event or state.

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

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

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

Detailed Definition
Condition is defined as the relation between:
UW1 - a focused event or state, and
UW2 - a conditioning event or state,
where:

- UW1 and UW2 are different 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) which influences whether or when UW1 can happen.

Examples and readings
aoj:01(green(aoj>thing), light (icl>thing))
If light is green, ... go
con(go(icl>do), :01)

coo (co-occurrence)

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

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

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

Detailed Definition
Co-occurrence is defined as the relation between:
UW1 - a focused event or state,
UW2 - a co-occurred event or state,

where:

- UW1 and UW2 are different, and
- UW1 occurs or is true at the same time as UW2.

Examples and readings
coo(run(icl>do), cry(icl>do)) ... run with crying

coo(red(aoj>thing), hot(aoj>thing))... is red while ...is hot

Related Relations
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. 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 an event occurs or a state exists.

dur (occur, period)
dur (do, period)
dur ((aoj>thing), period)

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

Detailed Definition
Duration is defined as the relation between:
UW1 - an event or state,
UW2 - a period that the event or state continues,

Examples and readings
dur(work(icl>do), hour(icl>period)) ... work nine hours
qua(hour(icl>period),9)
dur(talk(icl>do), meeting(icl>event) ... talk during meeting
dur(come(icl>do), absence(icl>state)) ... come during ... absence

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
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(a(icl>letter), z(icl>letter)) ... from a to z
fmt(Osaka(icl>place), New York(icl>place)) ... from Osaka to New York
fmt(Monday(icl>time),... from Monday to
Friday(icl>time)) Friday

Related Relations
Range is different from src and gol in that for src and gol, the initial and final states of some 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. 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 origin of a thing.

frm (thing, thing)

Syntax
frm[":"<Compound UW-ID>] "(" {<UW1>|":"<Compound UW-ID>}
","
{<UW26gt;|":"<Compound UW-ID>} ")"

Detailed Definition
Origin is defined as the relation between:
UW1 - a thing, and
UW2 - a origin of the thing,
where:

- UW2 describes the origin such as original position of UW1.

Examples and readings
frm(man(icl>person), Japan(icl>country)) ... man from Japan

gol (goal:final state)

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

gol (occur(gol>thing), thing)

gol (do(gol>thing), thing)

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

Detailed Definition
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(go(gol>place), sad(aoj>person) ... go ... to sad
gol(change(gol>thing), ... change ... to
red(aoj>thing)) red
gol(transform(gol>thing), ... is transformed
strong(aoj>thing)) ... to strong
gol(post(gol>thing), ... post ... to
account(icl>place))account

Related Relations
Final characteristics is different from tmf and plf in that gol describes qualitative characteristics and not time or place. Final characteristics is different from src in that gol describes the characteristics of the obj at the final state of the event.

ins (instrument)

Ins defines the 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
Instrument is defined as the relation between:
UW1 - an event, and
UW2 - a concrete thing,
where:
- UW2 specifies the concrete thing which is used in order to make UW1 happen.

Examples and readings
ins(look(icl>do),... look ... with

telescope(icl>thing)) telescope
ins(solve(icl>do), ... solve ... using
pencil(icl>thing)) pencil
ins(separate(icl>do), ... separate ...
knife(icl>thing))with knife

Related Relations
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. Instrument is different from met in that met is used for abstract things (abstract means or methods), whereas ins is used for concrete things.

man (manner)

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

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

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

Detailed Definition
Manner is defined as the relation between:
UW1 - an event or state,
UW2 - a manner,
where:
- The UWs are different, and
- UW1 is done or exist in a way characterized by UW2

Examples and readings
man(look(icl>do), quickly) ... look quickly
man(think(icl>do), often) ... think often ...
man(beautiful(aoj>thing), very)very beautiful

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

met (method of means)

Met defines the means to carry out an event.

met (do, abstract thing)

Syntax

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

Detailed Definition
Method or means is defined as the relation between:
UW1 - an event, and
UW2 - an abstract thing,
where:

- UW2 specifies the abstract thing is used or the steps carried out in order to make UW1 happen.

Examples and readings
met(solve(icl>do),... solve ... with
dynamics(icl>abstract thing)) dynamics
met(solve(icl>do),... solve ... using algorithm(icl>abstract thing))algorithm
met(separate(icl>do), cut(icl>do)) ... separate ... by cutting ...

Related Relations
Method or means is different from man in that man describes an event as a whole, whereas met characterizes the component steps, procedures or instruments of the event. 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 which restricts a focused thing.

mod (thing, thing)
mod (thing, (mod>thing))

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

Detailed Definition
Modification is defined as the relation between:
UW1 - a focused thing,
UW2 - a thing which restricts UW1 in some way

Examples and readings
mod(story(icl>thing), whole) whole story
mod(plan(icl>thing), master) master plan
mod(part(icl>thing), main) main part
qua(block(icl>thing), 3)) three blocks of ice
mod(ice(icl>thing), block(icl>thing))
mod(story(icl>thing), whole) whole story
mod(part(icl>thing), main)
mod(ice(icl>thing), block(icl>thing))

Related Relations
Modification is different from aoj in that aoj describes a state or characteristic of a thing, whereas mod merely indicates a restriction, which might indirectly suggest some characteristics of the thing described. Most mod relations require a paraphrase introducing some implicit event to become clearer and even then many possibilities are usually available. Modification is different from man in that man describes a way to carry out an event or characteristics of a state.

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
Name is defined as the relation between:
UW1 - a thing,
UW2 - a thing used as a name,
where:
- UW2 is a name of UW1.

Examples and readings
nam(tower(icl>thing), Tokyo(icl>thing)) Tokyo tower

obj (affected thing)

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

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

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

Detailed Definition
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(icl>do), table(icl>thing)) table move
obj(melt(icl>occur), snow(icl>thing)) snow melt
obj(cure(icl>do), paitient(icl>person)) cure paitient
obj(have(aoj>thing,obj>thing), ... have a pen(icl>thing)) pen

Related Relations
Affected thing is different from cob in that the obj is in focus, whereas the cob is related to a second, non-focused implicit event or state.

opl (affected place)

Opl defines a place in focus where an event affects.

opl (do, place)

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

Detailed Definition
Affected place is defined as the relation between:
UW1 - an event, and
UW2 - a place or thing defining a place,
where:
- UW2 is the specific place where the change described by UW1 is directed, or
- UW2 is a place that is seen as being affected during the event.

Examples and readings
opl(pat(icl>do), shoulder(icl>thing)) ... pat ... on shoulder
opl(cut(icl>do), middle(icl>place)) ... cut ... in middle

Related Relations
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. Affected place is different from plc in that the affected place is characterized by the event, while the physical and logical place define the environment in which the event happens.

or (disjunction)

Or defines disjunctive relation between two concepts.

or (thing, thing)

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

Detailed Definition
Disjunction is defined as the relation between:
UW1 - a thing 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(stay(icl>do), leave(icl>do)) ... stay or leave
or(red(icl>color), blue(icl>color)) ... red or blue
or(John(icl>person), Jack(icl>person))... John or Jack

Related Relations
Disjunction is different from conjunction in that the disjunction things are grouped in order to say that something is true for one or the other, whereas in conjunction they are grouped to say that the same is true for both. Disjunction in formal logic permits three situations for a disjunction to be true: 1) it is true for UW1, 2) it is true for UW2, 3) it is true for both. On the other hand, 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
Proportion, rate or distribution is defined as the relation between:
UW1 - a quantity,
UW2 - a quantity, or a thing seen as a quantity,
where:

- 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(2, day(icl>period)) ... two ... per day
per(time(icl>unit), week(icl>period))... twice a week
qua(time(icl>unit), 2)

plc (place)

Plc defines the place an event occurs or a state is true or a thing exists.

plc (occur, thing)
plc (do, thing)
plc ((aoj<thing), thing)
plc (thing, thing)

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

Detailed Definition
Place is defined as the relation between:
UW1 - an event , state, or thing,
UW2 - a place or thing understood as a place,

Examples and readings
plc(cook(icl>do), kitchen(icl>thing)) ... cook ... in kitchen
plc(sit(icl>do), beside(icl>relative place)) ... sit beside ...
plc(red(aoj>thing), bottom(icl>thing)) ... red on bottom

Related Relations
Place is different from plf and plt or src and gol in that plc describes a place with respect to an event as a whole, whereas these other relations describe position with respect to parts of an event. Place is different from opl in that plc is not seen as being modified by an event, merely a reference point for characterizing it, whereas opl is seen as being modified.

plf (initial place)

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

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

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

Detailed Definition
"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(go(icl>do), home(icl>place)) ... go from home
plf(call(icl>do), New ... call from New York(icl>place)) York
plf(cut(icl>do), edge(icl>place)) ... cut ... from edge ...
plf(beautiful(aoj>thing), ... is beautiful side(icl>place)) from side ...

Related Relations
Initial place is different from plc in that plc describe events or states taken as wholes, whereas plf describes only the initial part of an event or state. 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. Initial place is different from src in that plf describes the place where the event began, whereas src describes the initial state of the obj.

plt (final place)

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

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

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

Detailed Definition
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(talk(icl>do), Boston(icl>place))... talk ... until Boston
plt(cut(icl>do), edge(icl>place)) ... cut ... to edge
plt(beautiful(icl>state), fence(icl>thing)) ... is beautiful up to fence

Related Relations
Final place is different from plc in that plc describe events or states taken as wholes, whereas plt describes only the final part of an event. 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. Final place is different from gol in that plt describes the place where an event or state ended, whereas gol described the final state of the obj.

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 part thing, and
UW2 - a whole thing,
where:
- UW1 is the part of UW1.

Examples
pof(wing(icl>body), bird(icl>animal)) Bird's wing.
pos (possessor)

Pos defines possessor of a thing.

pos (thing, volitional thing)

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

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

Examples and readings
pos(dog(icl>thing), John(icl>person)) John's dog
pos(book(icl>thing), i) my book

ptn (partner)

Ptn defines 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

Partner is defined as the relation between:
UW1 - an action, and
UW2 - a human or non-human, seen-as-volitional thing
where:

- UW2 is thought of as having a direct role in making an indispensable part of UW1 happen, and
- UW1 is the same, collaborative event as that initiated by the agent, and
- UW2 is seen as not being in focus (as compared to the agent).

Examples and redings
ptn(compete(icl>do), John(icl>person)) ... compete with John
ptn(share(icl>do),poor(icl>person)) ... share ... with poor
ptn(collaborate(icl>do), ... collaborate
machine(icl>thing)) with machine

Related Relations
Partner is different from agt in that the agent and its event are in focus, while the partner and its event are not in focus. Partner is different from cag in that the co-agent initiates an event that is independent of the agent's event, whereas the partner initiates the same event together with the agent. Partner is different from con in that the partner initiates the same event as the agent does whereas the condition is only an indirect influence on that event.

pur (purpose or objective)

Pur defines the purpose or objectives of agent of an event or the purpose of a thing exist.

pur (occur, occur)
pur (occur, do)
pur (do, occur)
pur (do, do)
pur (occur, thing)
pur (do, thing)
pur (thing, occur)
pur (thing, do)
pur (thing, thing)

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

Detailed Definition
Purpose or objective is defined as the relation between:
UW1 - a thing or an event, and
UW2 - a thing or an event,
where:

- The UWs are different, and

When UW1 is an event:

- UW2 specifies the agent's purpose or objectives, or

- UW2 specifies the thing (object, state, event, etc.) that the agent desires to attain by carrying out UW1, or

When UW1 is not an event:

- UW2 is what UW1 is to be used for.

Examples and readings

pur(come(icl>do), see(icl>do)) ... come to see
pur(work(icl>do), money(icl>do)) ... work for money
pur(budget(icl>money), ... budget for
research(icl>do)) research

Related Relations

Purpose or objective is different from gol in that pur describes the desires of the agent, whereas gol describes the state of the obj at the end of the event. Purpose or objective is different from man and met in that pur describes the reason why the event is being carried out, while man and met describe how it is being carried out.

qua (quantity)

Qua defines quantity of a thing or unit.

qua (thing, quantity)

Syntax

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

Detailed Definition

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(block(icl>thing), 3)) three blocks of ice
mod(ice(icl>thing), block(icl>thing))
qua(kilo(icl>unit), many(aoj>thing)) many kilos ...
qua(truckload(icl>unit), 7)seven truckload ...

Related Relations

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

rsn (reason)

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

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

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

Detailed Definition
Reason is defined as the relation between:
UW1 - an event or state,
UW2 - a reason of an event or state,
where:
- UW2 is a reason that UW1 happens.

Examples and readings
rsn(go(icl>do), illness(icl>thing))go because of illness
agt:01(arrive(icl>occur), Mary(icl>person)) Because Mary arrive, team collaborate
agt:02(collaborate(icl>do), team(icl>person)
rsn(:02, :01)

scn (scene)

Scn defines a virtual world where an event occurs or state is true or a thing exists.

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

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

Detailed Definition
Scene is defined as the relation between:
UW1 - an event or state or thing,
UW2 - an abstract or metaphorical thing understood as a place, where:
- The UWs are different, and

- UW1 is or happens in a place characterized by UW2.

Examples and readings
scn(win(icl>do), competition(icl>event)) ... win ... in competition
scn(apear(icl>occur), program(icl>thing))... appear on TV program
mod(program(icl>thing),TV(icl>thing))
scn(play(icl>do), movie(icl>thing)) ... play in movie

Related Relations
Scene is different from plc in that the reference place for plc is in real world, whereas for scn it is abstract or metaphorical world.

seq (sequence)

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

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

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

Detailed Definition
"Sequence" is defined as the relation between:
UW1 - a focused event or state,
UW2 - a prior event or state,
where:
- The UWs are different, and
- UW1 occurs or is true after UW2.

Examples and readings
seq(leap(icl>dot), look(icl>do)) ... look before leaping
seq(green(aoj>thing), ... was red before
red(aoj>thing)) ... was green

Related Relations
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. Sequence is different from bas in that seq describes events or states in terms of order in time, whereas bas describes things or states in terms of qualitative differences or similarities.

src (sorce:initial state)

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

src (occur, thing)
src (do, thing)

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

Detailed Definition
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 obj of UW1 at the beginning of UW1, or
- UW2 is a thing that is associated with the obj of UW1 at the beginning of UW1.

Examples and readings
src(go(icl>change),
sad(aoj>thing))... go from sad ...
src(change(icl>occur),
red(aoj>thing))... change from red
src(transform(icl>do), ... is transformed
weak(aoj>thing)) from weak ...
src(steal(icl>do), ... steal ... from
bank(icl>thing)) bank

Related Relations
Initial state is different from tmf and plf in that src describes qualitative characteristics and not time or place. Initial characteristics is different from gol in that gol describes the characteristics of the obj at the final state of the event.

tim (time)

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

tim (occur, time)
tim (do, time)
tim ((aoj>thing), time)

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,

UW2 - a time,
where:

- UW1, taken as a whole, occurs at the time indicated by UW2.

Examples and readings
tim(look(icl>do), Tuesday(icl>time))... look on Tuesday
tim(cut(icl>do), o'clock(icl>time)) ... cut ... at ... o'clock
tim(start(icl>do), come(icl>do)) ... start when ...come

Related Relations
Time is different from tmf and tmt in that time characterized 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 a time an event starts or a state become true.

tmf (occur, time)
tmf (do, time)
tmf ((aoj>thing), time)

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,
where:

- UW2 specifies the time at which UW1 started, or
- UW2 specifies the time at which UW1 became/become true.

Examples and readings
tmf(look(icl>do), morning(icl>time))... look since morning
tmf(full(aoj>thing), noon(icl>time))... is full at noon

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 a 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 obj 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 the end of the event.

tmt (final time)

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

tmt (occur, time)
tmt (do, time)
tmt ((aoj>thing), time)

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,
where:
- UW2 specifies the time at which UW1 ended, or
- UW2 specifies the time at which UW1 became/becomes false.

Examples and readings
tmt(think(icl>do), ... think until
morning(icl>time)) moning
tmt(cut(icl>do), noon(icl>time)) ... cut until noon
tmt(full(aoj>thing), ... be full until
tomorrow(icl>time))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 a 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 obj 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 destination of a thing.

to (thing, thing)

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

Detailed Definition
Destination is defined as the relation between:
UW1 - a thing, and
UW2 - a destination of the thing,
where:

- UW2 describes the destination such as final position of UW1.

Examples and readings
to(train(icl>thing), London(icl>city)) ...train for London

via (intermediate place or state)

Via defines an intermediate place or state of an event.

via (occur(gol>thing,src>thing), thing)
via (do(gol>thing,src>thing), thing)

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

Detailed Definition
Intermediate place or state is defined as the relation between:
UW1 - an event, and
UW2 - a place or state,
where:
- W2 is the specific place or state describing the obj of UW1 at some time in the middle of UW1,
- UW2 is a thing that describes a place or state that the obj of UW1 passed by or through during UW1.

Examples and readings
via(go(icl>do), New ... go ... via New York(icl>place))York
via(bike(icl>do), Alps(icl>place)) ... bike ... through the Alps
via(drive(icl>do),... drive ... by way tunnel(icl>thing))of tunnel

Related Relations
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. 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.

3.4. Attributes

Attribute of UWs are used to describe 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. Conceptual relations and UWs are used to describe objectively things, events and states-of-affairs in the world. Attributed of UWs enrich this description with more information about how the speaker views these states-of-affairs and his attitudes toward them.

3.4.1. Types of Attributes

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 present time, but as "independently of specific times". Consider the example: The earth is round. This sentence is true in the past, in the present and in the future, independently of speaker time, so although the tense is "present" it is not interpreted as present time.

@past happened in the past
@present happening at present
@future will happen in future

2) Speaker's view of Aspect

A speaker can emphasize or focus on a 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. He can focus on the beginning of the event, looking forward to it (@begin-soon), or backward to it (@begin-just). He can focus on the middle of the event (@progress). He can also focus on the end of the event, looking forward to it (@end-soon) or backward to it from nearby (@end just) or from farther away (@complete). 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).

@begin-soon
@begin-just
@progress
@end-soon
@end-just
@complete
@state
@repeat

3) Speaker's view of Reference

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 anti-lope. 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
@def already referred
@indef non-specific class
@not complement set
@order ordinal number

These Attributes are usually attached to UWs that denote things.