

Introductions: Julia Bonn



- PropBank since 2009
- VerbNet since 2009
- AMR since 2010
- Spatial AMR architect

BFA sculpture

MA Cognitive Linguistics '10

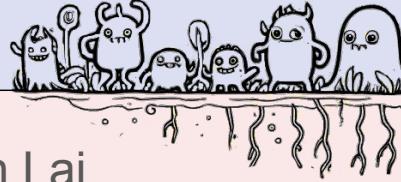
LING/ICS PhD student: Martha Palmer,
Alexis Palmer



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The UMR Team



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Julia Bonn

Jon Cai

Andy Cowell

Benet Post

Matt Buchholz

Jim Martin

Skatje Myers

Alvin Chen

Sijia Ge

U New Mexico:

Bill Croft

Meagan Vigus

Lukas Denk

Rosa Villejo

Jens Van Gysel

Charles Univ:

Jan Hajic

Zdenka Uresova

A Project History: 20+ years of SRL



Penn Treebank: NLP success in syntactic parsing

Marcus, Mitch, Beatrice Santorini, and Mary Ann Marcinkiewicz. "Building a large annotated corpus of English: The Penn Treebank." *Computational linguistics* 19, no. 2 (1993): 313-330.

tk treebank search #60

TREEBANK SEARCH

Sentence File lu.lisp Prolog Tree File lu.pl Load Files

Match Sentence regexp All Enabled Match Tree (Prolog) node(X,'VP').branching(X,3) One

Sentence Count: 317 Selected: 104 Show: Selected Only All Displayed Tree (Sentence): 43

```
((I (PRP)) (am (VBP)) (eager (JJR)) (to (TO)) (be (VB)) (her  
((I (PRP)) (believe (VBP)) (John (NNP)) (to (TO)) (be (VB))  
((I (PRP)) (believe (VBP)) (sincerely (RB)) (John (NNP)) (to  
((I (PRP)) (wanted (VBD)) (John (NNP)) (to (TO)) (leave (V  
((I (PRP)) (persuaded (VBD)) (John (NNP)) (to (TO)) (leave  
((I (PRP)) (wanted (VBD)) (it (PRP)) (to (TO)) (rain (VB)))  
((I (PRP)) (persuaded (VBD)) (it (PRP)) (to (TO)) (rain (VB))  
((I (PRP)) (wanted (VBD)) (the (DT)) (bus (NN)) (to (TO)) (le  
((I (PRP)) (persuaded (VBD)) (the (DT)) (bus (NN)) (to (TO)) (le  
((I (PRP)) (tried (VBD)) (to (TO)) (leave (VB))  
((I (PRP)) (tried (VBD)) (John (NNP)) (to (TO)) (leave (VB))  
((I (PRP)) (tried (VBD)) (it (PRP)) (to (TO)) (leave (VB))  
((I (PRP)) (tried (VBD)) (the (DT)) (bus (NN)) (to (TO)) (le  
((I (PRP)) (believe (VBP)) (John (NNP)) (to (TO)) (be (VB))  
((I (PRP)) (believe (VBP)) (John (NNP)) (to (TO)) (be (VB))  
((I (PRP)) (want (VBP)) (to (TO)) (be (VB)) (clever (NN)))  
((I (PRP)) (believe (VBP)) (to (TO)) (be (VB)) (clever (NN)))  
((John (NNP)) (was (VBD)) (persuaded (VBN)) (to (TO)) (be  
((John (NNP)) (was (VBD)) (believed (VBN)) (to (TO)) (be  
((John (NNP)) (was (VBD)) (wanted (VBD)) (to (TO)) (leave  
((John (NNP)) (is (VBZ)) (likely (JJ)) (to (TO)) (park (VB)) (le  
((John (NNP)) (is (VBZ)) (illegal (JJ)) (to (TO)) (park (VB)) (le  
((It (PRP)) (is (VBZ)) (likely (JJ)) (for (IN)) (John (NNP)) (to  
((It (PRP)) (is (VBZ)) (illegal (JJ)) (for (IN)) (John (NNP)) (to
```

```
graph TD; S --- NP; S --- VP; S --- SBAR; NP --- PRP[PRP]; NP --- VBZ[VBZ]; NP --- ADJP; ADJP --- JJ[JJ]; ADJP --- IN[IN]; IN --- SBAR; SBAR --- S1; S1 --- NP1; S1 --- VP1; NP1 --- NNP[NNP]; NP1 --- TO[TO]; TO --- NP2; NP2 --- VP2; VP2 --- VB[VB]; VP2 --- ADVP[ADVP]; ADVP --- RB[RB]; JJ --- illegal; IN --- for; NP2 --- John[John]; TO --- to; VB --- park[park]; RB --- here[here]
```

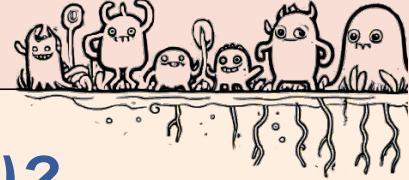
The Proposition Bank: using Treebank parse trees as scaffolding for semantic annotation

[Kingsbury, Paul, Martha Palmer, and Mitch Marcus. "Adding semantic annotation to the penn treebank." In *Proceedings of the human language technology conference*, pp. 252-256. 2002.](#)

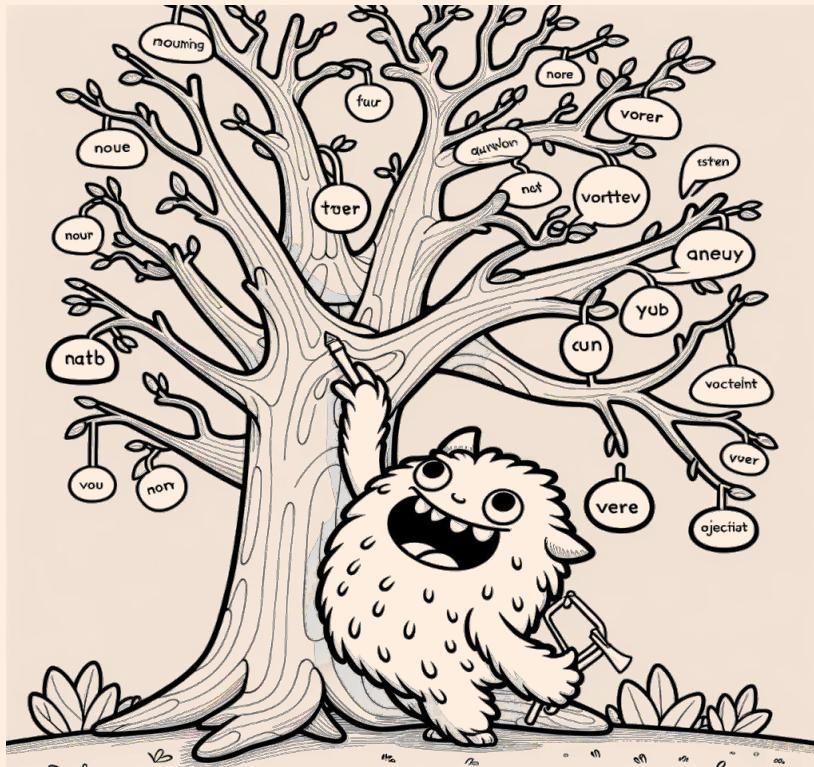
The screenshot displays the Jubilee 2.1 software interface, specifically the 1.task window. The interface is divided into three main panes:

- Treebank View:** On the left, it shows a hierarchical tree structure of a sentence. The root node is S, which contains LST, LS 1, NP-SBJ (1:1-ARG0), -NONE- *PRO*, VP, VBG Choosing 2:0-rel, NP (3:3-ARG1), NP, NP (II mountainous NNS locations), NP, ADVP (RB preferably), NP, QP (CD 1, SYM -, CD 3, NNS hours), PP (IN from), NP, and II main. The text below the tree is: "1. *PRO* Choosing mountainous locations , preferably 1 - 3 hours from main cities , which *T*-1 have water resources ."
- Frameset View:** In the center, it shows a frame entry for "choose". The ID is choose.01, and the name is choose, pick. It lists four arguments: Arg0 : picker, Arg1 : thing picked, Arg2 : group or source, Arg3 : benefactive, and Arg4 : secondary attribute on arg1.
- Argument View:** On the right, it shows a table for argument annotation. The columns are labeled 0, 1, 2, 3, 4, 5, A (A), M-ADV (V), M-CAU (C), M-DIR (D), M-DIS (I), M-DSP (B), M-EXT (E), M-LOC (L), M-MNR (M), M-MOD (O), M-NEG (N), M-SLC (G), M-PRD (7), M-PRP (P), M-RCL (R), M-REC (9), M-TMP (T), and -UNDEF (U). Below the table is an "ERASE (-)" button.

Semantic Annotation



What is semantic role labeling (SRL)?



Motivation: From Sentences to Propositions

Who did what to whom, when, where and how?

Powell **met** Zhu Rongji.



Powell and Zhu Rongji **met**.

Powell **met with** Zhu Rongji.

Powell and Zhu Rongji **had a meeting**.



Proposition: **MEET**(Powell, Zhu Rongji)

MEET(somebody 1, somebody 2)

"When Powell met Zhu Rongji on Thursday they discussed the return of the spy plane."

MEET(Powell, Zhu)

DISCUSS([Powell, Zhu], **RETURN**(X, plane))

Capturing Semantic Roles

Breaker - AGENT

- [*Tim*] broke [*the window*].

Thing broken - PATIENT

- [*The window*] was broken [by the hurricane].

Thing broken - PATIENT

- [*The window*] broke [*into pieces*] [*when it slammed shut*].

Semantic Role Labeling: PropBank Frame Files

11,500+ rolesets

VALENCY LEXICON

discuss.01 - talk about

ALIASES: discuss (**VERB**)

discussion (**NOUN**)

have_discussion (**LIGHT VERB CONSTRUCTION**)

ROLES:

ARG0-PAG: *discussant*

ARG1-PPT: *topic*

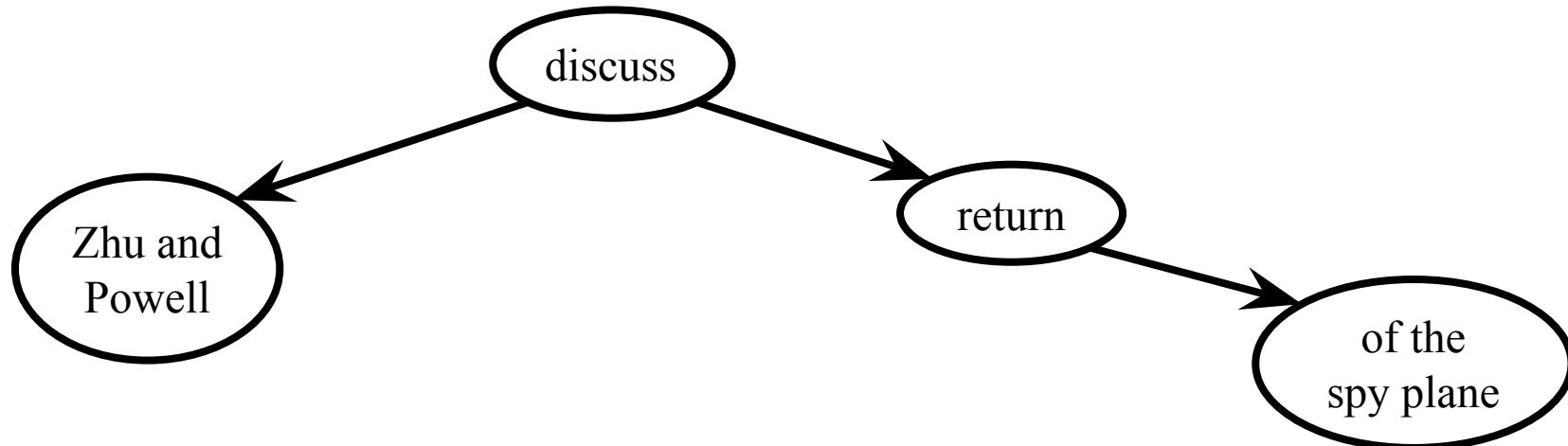
ARG2-COM: *conversation partner*

see Kingsbury & Palmer (LREC 2002) – Pradhan et. al. (*SEM 2022)

A Proposition as a Tree

“Zhu and Powell discussed the return of the spy plane.”

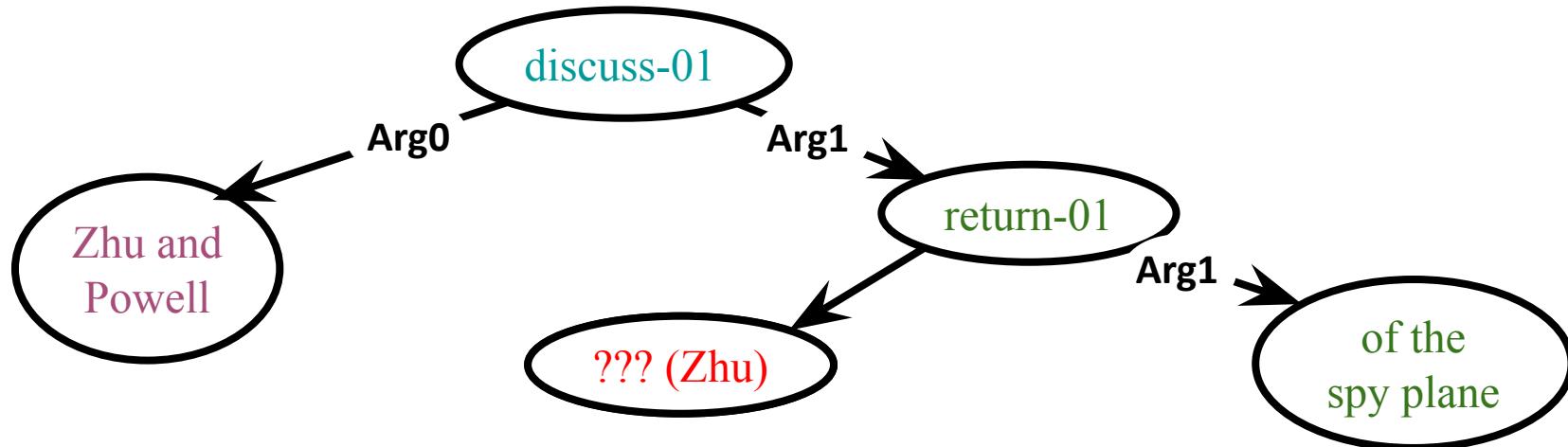
DISCUSS([Powell, Zhu], return(X, plane))



A Proposition as a Tree

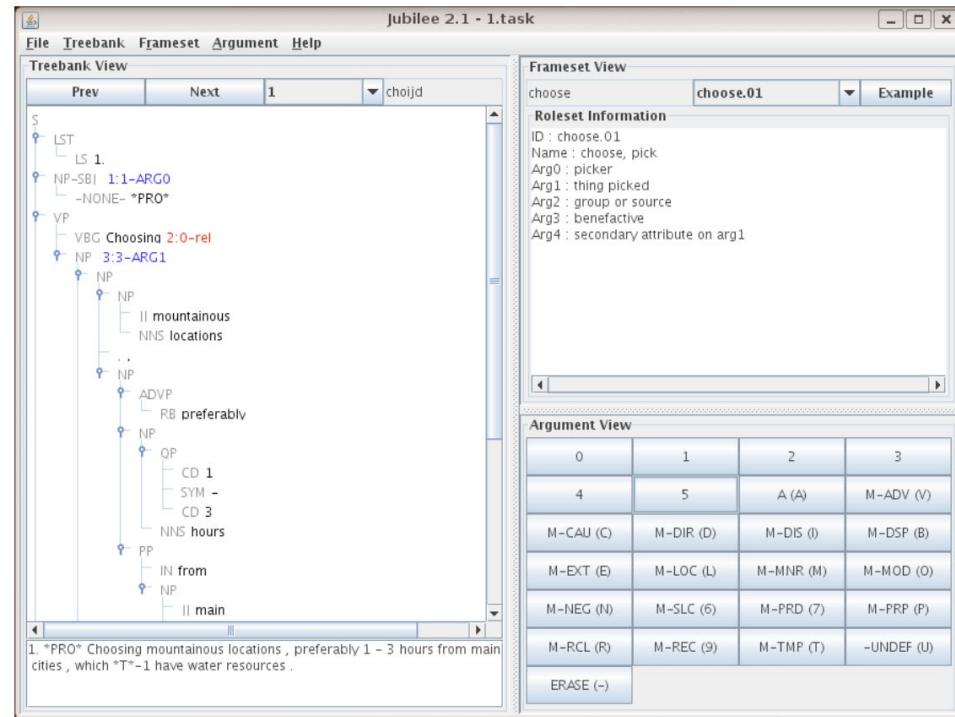
“Zhu and Powell discussed the return of the spy plane.”

DISCUSS([Powell, Zhu], return(X, plane))



PropBank:

- annotation of *propositions* by labeling text spans with semantic role labels
 - Proposition annotations stacked in post processing to create annotations for whole sentences



Marketers	1	NNS	O	B-NP	(S1(S(NP*))	2	nsubj	(A0*)	*
believe	2	VBP	O	B-VP	(VP*)	0	root	(V*)	*
most	3	RBS	O	B-NP	(SBAR(S(NP*))	4	amod	(A1*)	(A0*)
Americans	4	NNPS	O	I-NP	*)	7	nsubj	*	*)
wo	5	MD	O	B-VP	(VP*)	7	aux	*	(AM-MOD*)
n't	6	RB	O	I-VP	*	7	neg	*	(AM-NEG*)
make	7	VB	O	I-VP	(VP*)	2	ccomp	*	(V*)
the	8	DT	O	B-NP	(NP*)	10	det	*	(A1*)
convenience	9	NN	O	I-NP	*	10	nn	*	*
trade-off	10	NN	O	I-NP	*)))))))	7	dobj	*)	*)
...	11	:	O	O	*	2	punct	*	*
.	12	.	O	O	*))	2	punct	*	*

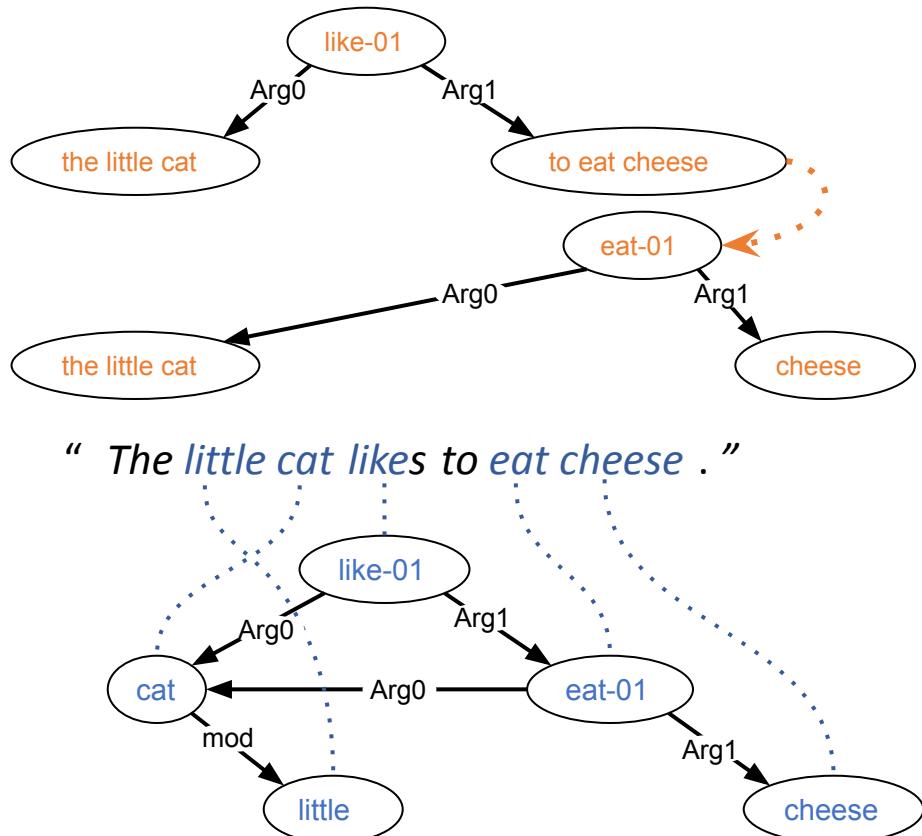
Abstract Meaning Representation: **AMR**

- **AMR** as a format is older ([Kasper 1989](#), [Langkilde & Knight 1998](#)), but with no PropBank, no training data.
- **Propbank showed that large-scale training sets could be annotated for SRL**
- **Modern AMR** ([Banarescu et al. \(2013\)](#)) main innovation: making large-scale sembanking possible:
 - AMR 3.0 more than 60k sentences in English
 - CAMR more than 20k sentences in Chinese



AMR Basics – SRL to AMR

- Shift from SRL to AMR – from spans to graphs
- In SRL we separately represent each predicate's arguments with spans
- AMR instead uses **graphs** with one node per concept

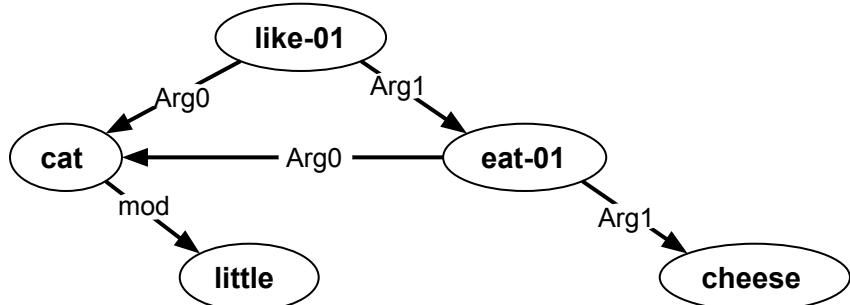


PENMAN Notation

Penman Notation



```
(l / like-01  
:ARG0 (c / cat  
:mod (l2 / little))  
:ARG1 (e / eat-01  
:ARG0 c  
:ARG1 (c2 / cheese)))
```

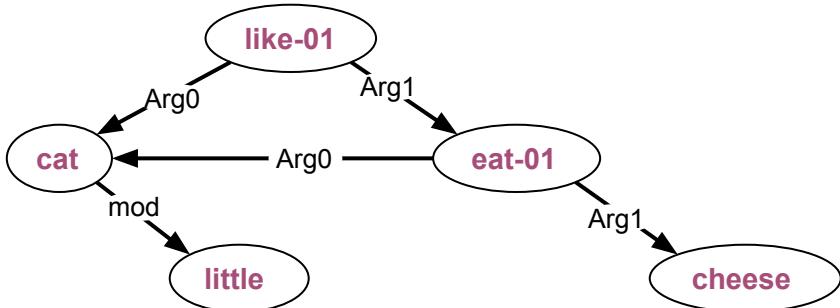


"The little cat likes to eat cheese"

PENMAN Notation

- **concepts** from the sentence appear as nodes

```
(I / like-01
  :ARG0 (c / cat
    :mod (I2 / little))
  :ARG1 (e / eat-01
    :ARG0 c
    :ARG1 (c2 / cheese)))
```

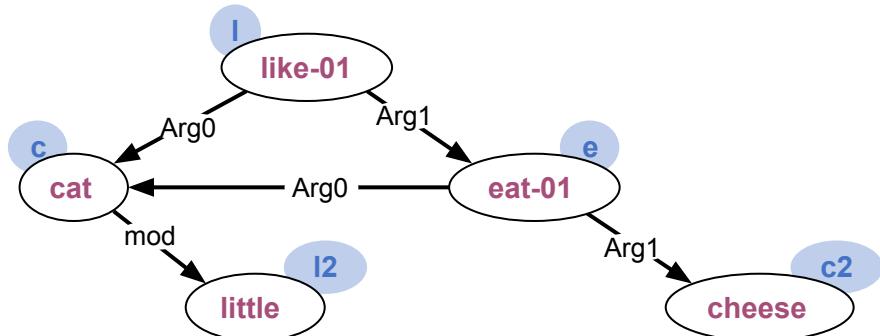


“The **little cat likes to eat cheese**”

PENMAN Notation

- **concepts** from the sentence appear as nodes
- unique **variables** identify each concept

```
(I / like-01
  :ARG0 (c / cat
    :mod (I2 / little))
  :ARG1 (e / eat-01
    :ARG0 c
    :ARG1 (c2 / cheese)))
```

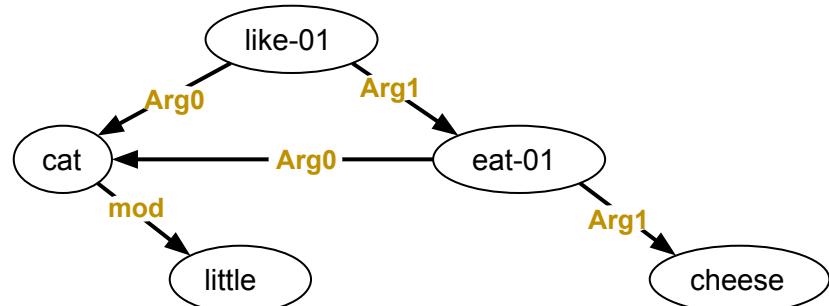


"The little cat likes to eat cheese"

PENMAN Notation

- **Edges** are represented by:
 - → indentation
 - colons (**:EDGE**)

```
(l / like-01
  :ARG0 (c / cat
  :mod (l2 / little))
  :ARG1 (e / eat-01
  :ARG0 c
  :ARG1 (c2 / cheese)))
```



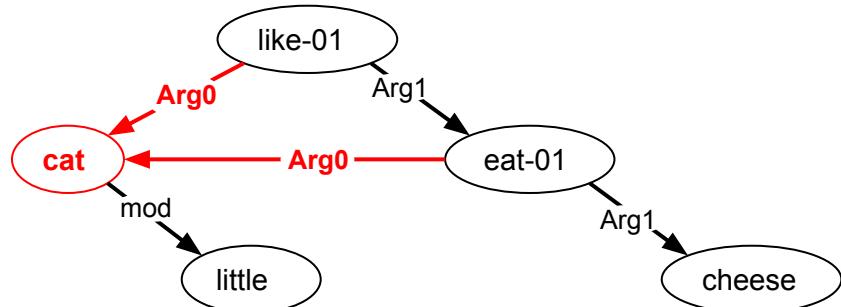
“The little cat likes to eat cheese”

PENMAN Notation

Re-entrancy of variables:

- For concepts that are the target of multiple edges in a graph
- Once a concept has a variable:
 - use that variable to refer to it anywhere else in the graph
 - applies to *any* kind of reference to the same entity-- paraphrases, pronouns, etc.

```
(I / like-01
  :ARG0 (c / cat
          :mod (I2 / little))
  :ARG1 (e / eat-01
  :ARG0 c
  :ARG1 (c2 / cheese)))
```



"The little cat likes to eat cheese"

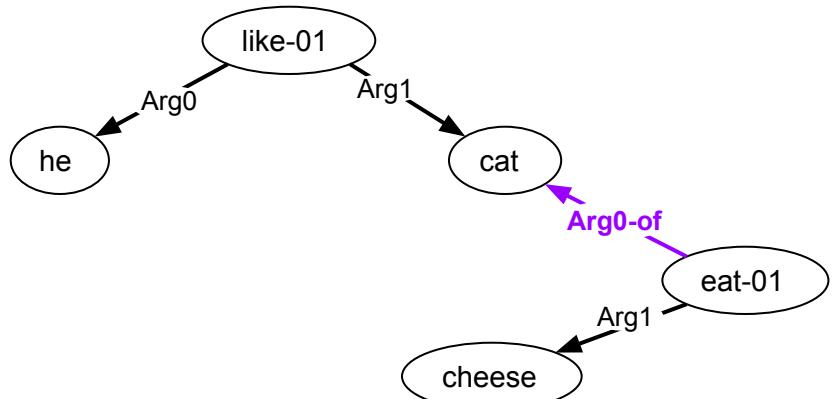
PENMAN Notation

Inverse roles:

- Allow us to encode things like relative clauses
- Any relation of the form “**:X-of**” is an inverse
- Meaning is interchangeable!

(predicate, ARG0, entity) = (entity, ARG0-of, predicate)

(I / like-01
:ARG0 (h / he)
:ARG1 (c / cat
:ARG0-of (e / eat-01
:ARG1 (c2 / cheese))))



“He likes cats that eat cheese”

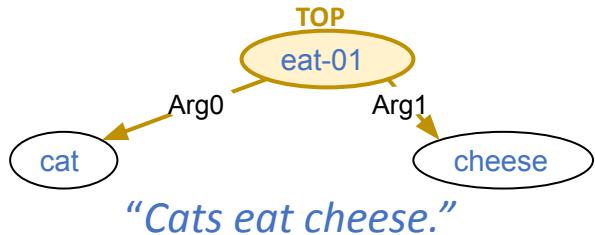
PENMAN Notation

Semantically-rooted graphs:

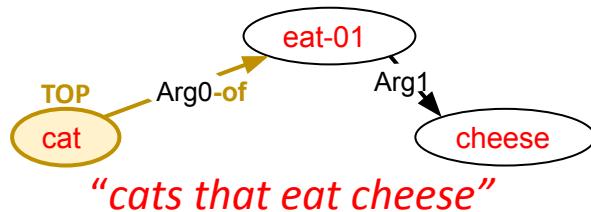
- Same graph for “cats eat cheese” and “cats *that* eat cheese”?



- No! Every graph gets a “Top” edge defining the semantic head/root



(e / eat-01
:ARG0 (c / cat)
:ARG1 (c2 / cheese))



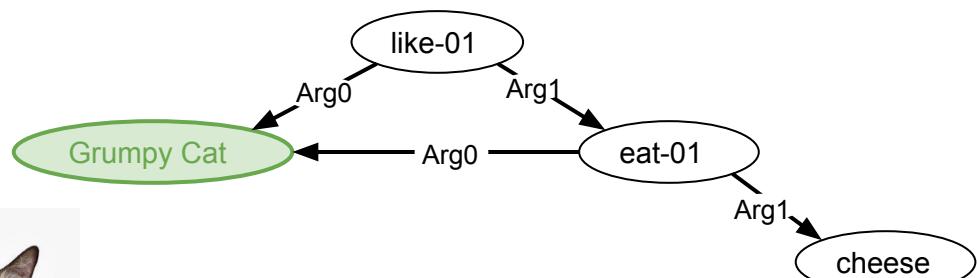
(c / cat
:ARG0-of (e / eat-01
:ARG1 (c2 / cheese)))

PENMAN Notation

Named Entities:

(I / like-01
:ARG0 ?

:ARG1 (e / eat-01
:ARG0 a
:ARG1 (c2 / cheese)))

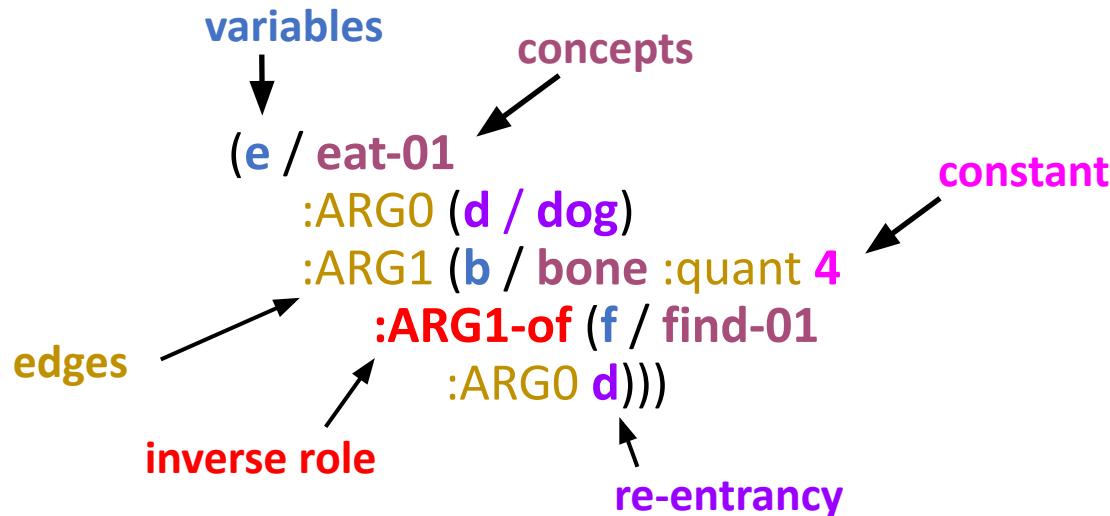


"Grumpy Cat likes to eat cheese"

PENMAN Notation

- That's AMR notation! Let's review:

"The dog ate the four bones it found."



AMR Basics – Annotation Philosophy

- AMR does **limited normalization**
 - reduces *arbitrary syntactic variation* (“syntactic sugar”)
 - maximizes cross-linguistic robustness
- All **predicative things** → **PropBank rolesets**
 - verbs, adjectives, many nouns
 - *Some* morphological decomposition
- **Limited speculation:**
 - represent direct contents of sentence
 - add pragmatic content only when it can be done ***consistently***
- **Canonicalize** the rest:
 - removal of semantically light predicates and some features like definiteness (*controversial*)

AMR Basics 2 – Annotation Philosophy

Normalization of predicates:

- We generalize across **parts of speech** and **etymologically related words**:

<i>My fear of snakes</i>	NOUN	fear-01
<i>I am fearful of snakes</i>	ADJECTIVE	fear-01
<i>I fear snakes</i>	VERB	fear-01
<i>I'm afraid of snakes</i>	ADJECTIVE	fear-01

- But we *don't* generalize over **synonyms** (hard to do consistently):

<i>My fear of snakes</i>	NOUN	fear-01
<i>I'm terrified of snakes</i>	ADJECTIVE	terrify-01
<i>Snakes creep me out</i>	VERB+PARTICLE	creep_out-03

AMR Basics 2 – Annotation Philosophy

Semantic-concept-to-node ratio:

- Ideally 1:1
- But, **multi-word expressions?**
 - modeled as a single node
- **Morphologically complex words?**
 - Some → **decomposed**
 - but, limited
 - e.g. kill does not become “cause to die”

“The *thief* was *lining his pockets* with their *investments*”

(I / line-pocket-02
:ARG0 (p / person
:ARG0-of (t / thief-01))
:ARG1 (t2 / thing
:ARG2-of (i2 / invest-01
:ARG0 (t3 / they))))

AMR Basics 2 – Annotation Philosophy

Canonical forms:

- All concepts drop **plurality, aspect, definiteness**, and **tense**
- Non-predicative terms simply represented in **singular, nominative** form

a cat

the cat

cats

the cats

eating

eats

ate

will eat

they

their

them

(c / cat)

(e / eat-01)

(t / they)

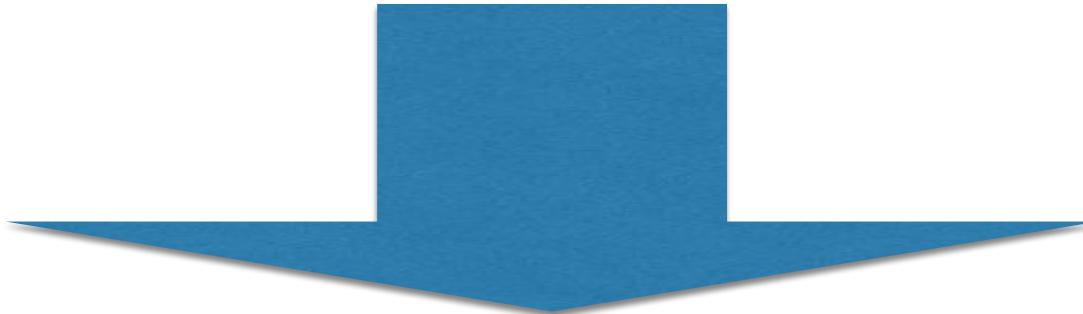
AMR Basics 2 – Annotation Philosophy

The man described the mission as a disaster.

The man's description of the mission: disaster.

As the man described it, the mission was a disaster.

The man described the mission as disastrous.



(d / describe-01
:ARG0 (m / man)
:ARG1 (m2 / mission)
:ARG2 (d / disaster))

Practice - Let's Try some Sentences

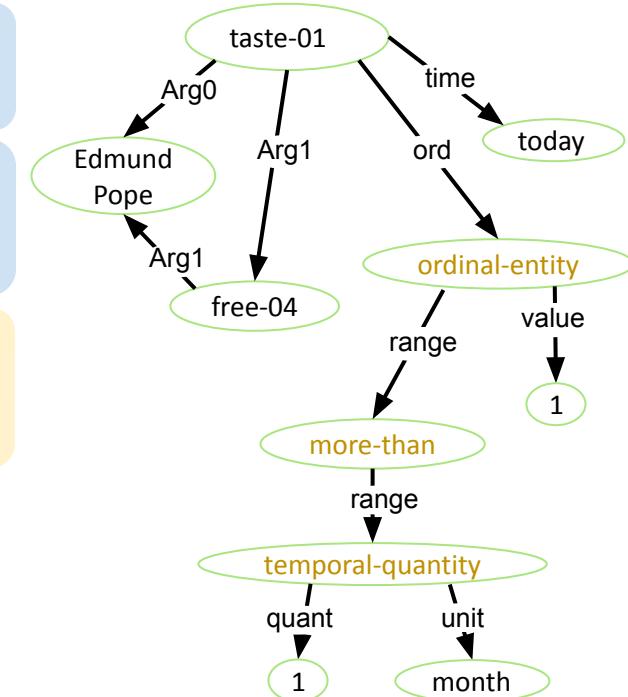
- *Edmund Pope tasted freedom today for the first time in more than **eight months**.*

```
(t / taste-01
  :aspect state
  :modal-strength full-affirmative
  :ARG0 (p / person :wiki "Edmund_Pope"
    :name (n / name :op1 "Edmund" :op2 "Pope"))
  :ARG1 (f / free-04
    :ARG1 p)
  :temporal (t / today)
  :ord (o / ordinal-entity :value 1
    :range (m / more-than
      :op1 (t2 / temporal-quantity :quant 8
        :unit (m2 / month))))))
```

taste-01
:ARG0 *experiencer*
:ARG1 *stimulus*

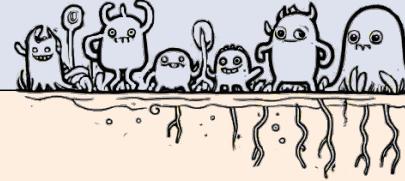
free-04
:ARG1 *free entity*
:ARG2 *free from what*
:ARG3 *free to do what*

:temporal
:ord
:value
:range





AMR Extensions



- Multi-sentence AMR (O'Gorman et al., 2018)
- Spatial AMR (Bonn et al., 2020)
- Temporal AMR (Wright-Bettner et al, 2019)
- Dialogue AMR (Bonial et al., 2020)
- Gesture AMR (Brutti et al., 2022)

Cross-lingual AMR adaptations

- Designed for English, now **extended to many other languages**
- Cross-lingual adaptations **vary in approach**
- AMR as an **interlingua**:
 - for Czech , Chinese , and Spanish
(Urešová et al., 2014; Xue et al., 2014; Wein et al., 2022b; Wein and Schneider, 2021)

Cross-lingual AMR adaptations

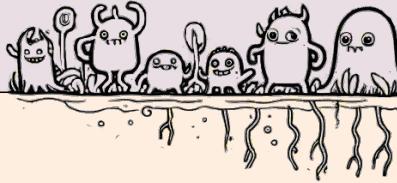
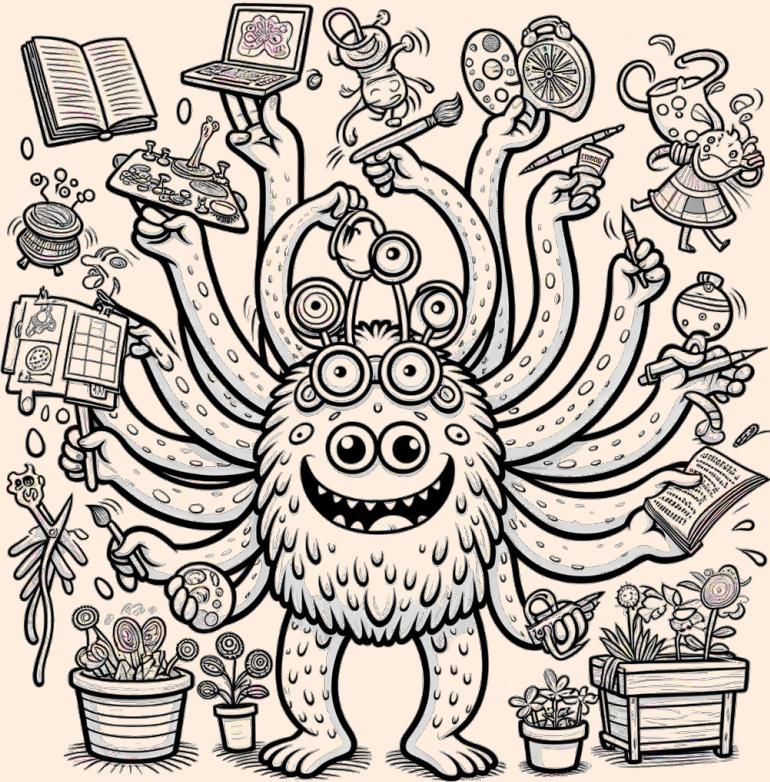
Adaptations of AMR to Other Languages:

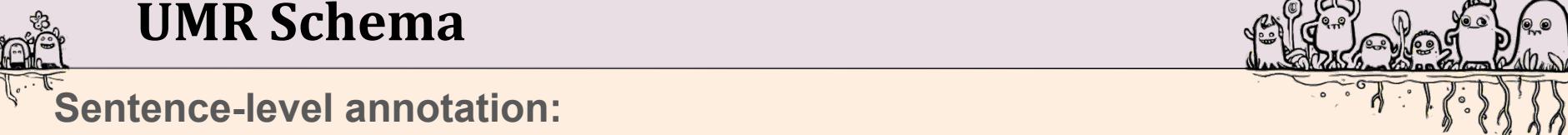
Language	Lexical Resource Used	Corpus
Chinese	Chinese Discourse Treebank	The Little Prince
Spanish	English PropBank Ancora	The Little Prince AMR 3.0 Data (news, etc.)
Portuguese	FrameSet Verbo-Brasil	The Little Prince News, PropBank.BR
Vietnamese	Vietnamese Comp. Lexicon	The Little Prince
Korean	Korean PropBank	ExoBrain
Turkish	<i>[unspecified]</i> PropBank	The Little Prince
Persian	Perspred, English PropBank	The Little Prince

UMR!

Goal:

Do all of the things the AMR extensions do, uniformly, while accounting for typological diversity





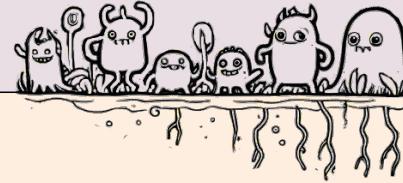
UMR Schema

Sentence-level annotation:

- AMR-like base
- Plus:
 - Aspect
 - Tense
 - Modality
 - Expanded quantification & scope
 - Expanded discourse relations
- Cross-lingual uniformity
 - Semantic categories updated
 - lattices
 - Roles, NEs, pronouns
 - Non-prototypical predication
 - Granularity options:
 - paradigmatic lattices support cross-linguistic diversity
- Ability to annotation languages without pre-existing rolesets



UMR Schema



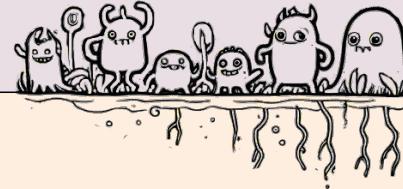
Document-level annotation:

- Temporal dependency:
 - Taken from:
- Coreference dependency:
 - Similar to Multi-sentence AMR
- Modal dependency

Token Alignments



UMR Schema

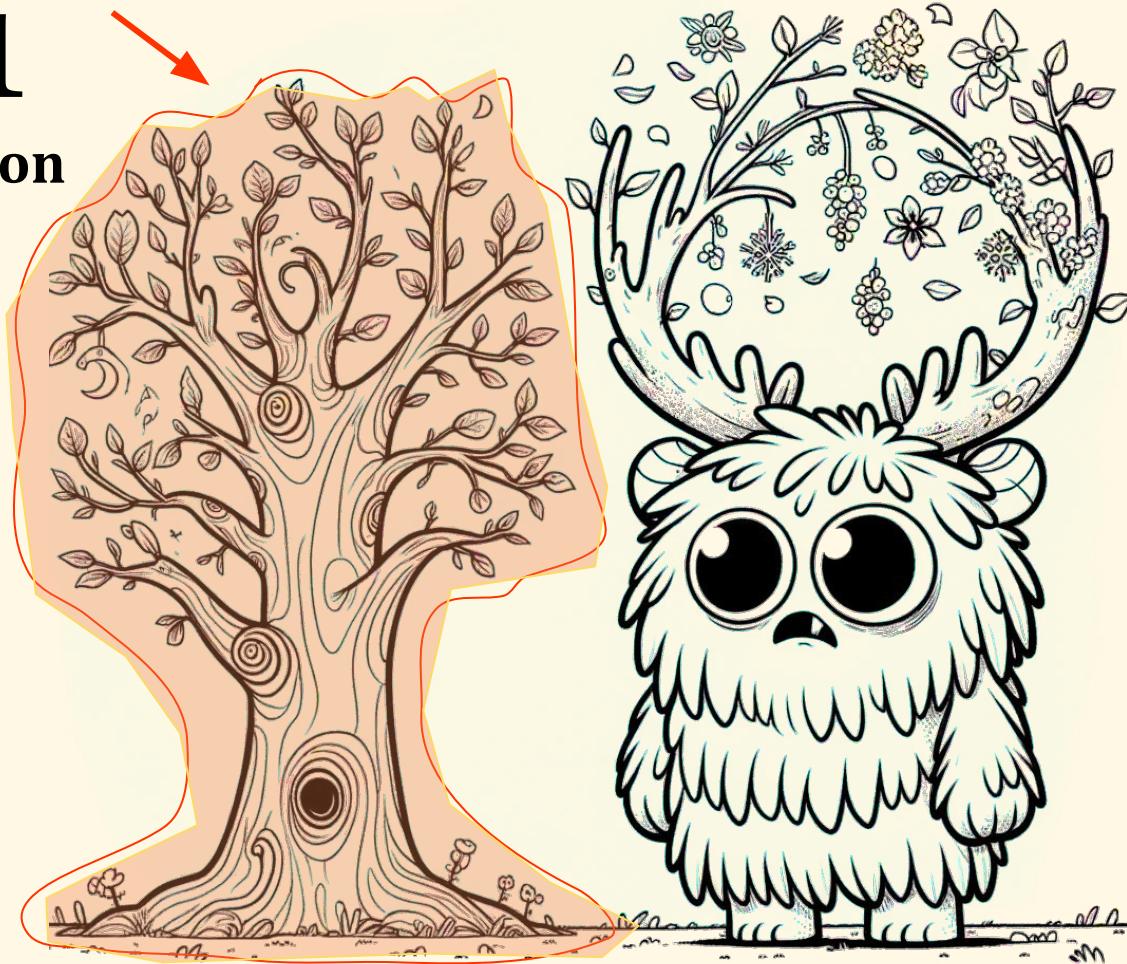


In development:

- Dialogue strategies
 - Multiple speakers
 - Speech acts
- Multimodal annotation
 - Gesture
 - Spatial Relations
- Digging in to polysynthetic and agglutinating languages
 - Lexicon & annotation strategies

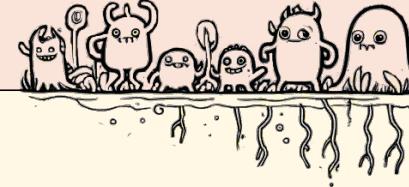
UMR Part 1

Sentence-level Annotation





Graph Elements: physical structures of graphs

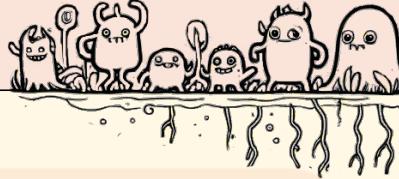


Graph Concepts:

- Basic concept: **(s1l / lemma)**
 - Has a variable
 - Has parentheses
- Roleset ID or predicate label: **(s1l / lemma-00)**
 - Has parentheses
 - Has a variable
 - And a 2-digit numeric suffix
- String: **“String”**
 - No variable
 - No parentheses
 - Has quotation marks
- Constant: **1000, full-affirmative, -**
 - No variable
 - No parentheses
 - No quotation marks

Variables have sentence ID prefixes in UMR:
s1b2

Graph Elements: physical structures of graphs



Graph Relations: Same as AMR

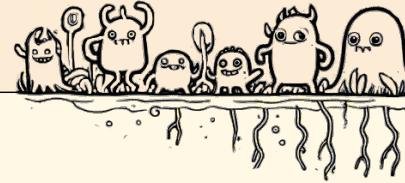
- indented
- Start with a colon :role, :ARG1
- Inverse forms :role-of, :ARG1-of



Grumpy Cat likes to eat 3 cheese balls before bed.

```
(s1l / like-01
  :aspect state
  :modal-strength full-affirmative
  :ARG0 (s1a / animal
    :name (s1n / name :op1 "Grumpy" :op2 "Cat"))
  :ARG1 (s1e / eat-01
    :aspect habitual
    :modal-strength full-affirmative
    :ARG0 s1a
    :ARG1 (s1c2 / cheese
      :unit (s1b / ball)
      :quant 3)
    :temporal (s1b2 / before
      :op1 (s1b3 / bed))
  :modal-predicate s1l)
```

Schema Elements: capturing meaning



Semantic Relations:

- **Participant roles:**
 - Semantically essential participants
 - Now includes roles for things like agents, patients, etc, which were handled exclusively with numbered args in AMR
- **Non-participant roles:**
 - Less essential participants & modifier roles
- **Attributes:**
 - *These take Constants as their values*
 - :aspect
 - :polarity
 - :mode
 - :quant
 - :degree
 - :refer-person, :refer-number

Relations: participant roles

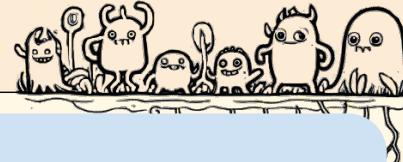


:actor	Animate entity that initiates the action
:undergoer	Entity ((in)animate) affected by the action
:theme	Entity ((in)animate) that moves from one entity to another, spatially or metaphorically
:experiencer	Animate entity that cognitively/sensorily experiences a stimulus
:stimulus	Entity ((in)animate) that is experienced by an experiencer
:force	Inanimate entity that initiates the action
:causer	Animate entity that acts on another animate entity to initiate action
:cause	Inanimate entity that causes the action to happen
:reason	Motivation for the actor to initiate the action
:purpose	Intended event that results from the action
:companion	Animate entity that acts with the actor to initiate the action
:affectee	Animate entity which the action has a pos/neg influence on (beneficiary/maleficiary)

The doctor laughed
He burned **the onions**
She put **the books** on the shelf
The dog heard a sound
The dog heard **a sound**
The wind knocked down the tree
The mother made him eat the broccoli
He was late because of **the fire**
They got married because **they are in love**
They dropped water in order to **fight the fire**
He cooked dinner **with his wife**
He made a cake for **the dog**



Relations: participant roles



:recipient

Animate entity that gains possession/control of another entity

:instrument

Inanimate entity that is manipulated by an external causer in order to initiate the action

:manner

Manner in which the action takes place

:place

Location at which the action takes place

:source

Entity from which the theme detaches

:start

Location at which a motion event begins

:goal

Location at which the action ends; end point at which the theme arrives

:temporal

event/time that has a temporal relation with the action

:material

Entity (inanimate) that is transformed into a new entity

:extent

Measurement phrase

:other-role

This role can be used when an annotator is unsure of which participant role is appropriate

He gave the cake to **the dog**

She hit him with **a broom**

She excercised by **lifting weights**

He read a book in **the garden**

He plucked a flower from **the bush**

She biked from **her house**

She put the books **on the shelf**

She left **after dinner**

He made a roux with **flour and butter**

He ran **seven miles**

I battled with **my foe**

Relations: participant roles



EXTERNAL AFFECTORS:

:actor

:companion

:instrument

:force

:causer

:cause

CENTRAL EVENT TYPES WITH CENTRAL ROLES:

CHANGE OF STATE:

:material, :undergoer

MOTION/LOCATION:

:theme, :goal, :start, :source, :place

TRANSFER:

:theme, :recipient

EXPERIENTIAL:

:experiencer, :stimulus

CIRCUMSTANTIAL:

:affectee

:place

:manner

:purpose

:reason

:temporal

:extent

Relations: non-participant roles



:direction

Direction of motion, literal or fictive

He walked **towards home**

:path

Path of motion, literal or fictive

He walked **in a circle**

:duration

How long an event persists

He walked **for 10 minutes**

:frequency

How often an event occurs

He walked **every morning**

:possessor

The entity who owns/controls another entity

She found **her hammer**

:topic

The subject matter of an entity/event

The talked about **the weather**

:medium

Medium through which an event occurs

She called him **on the phone**

:age

Age of an entity

He felt 200 years old

:example

Exemplars of a set of entities/events

He packed some snacks
like **cheese and fruit**

:part

A constituent part of an entity/event

Her hand felt cold

:group

A set of entities/events

A flock of birds

Relations: non-participant roles



:ord

For count/rank

:list-item

For list numbering

:mod

Catch-all role for modifiers that don't fall into other roles

:vocative

For cases where an entity is addressed by name

:pure-addition

When two events form a complex figure whose ordering is not specified

:apprehensive

Two events are mutually exclusive alternatives. Carrying out one precludes the other

:substitute

One event is a replacement for another

:subtract

One event is characterized by the absence of another

:condition

One event is contingent upon another

:concessive-condition

One event will be true under the range of conditions given

:concession

Speaker believes both events will occur, but co-occurrence is unexpected

I climbed to the **2nd** floor

b) other

That girl

He ate some cake **too**
I don't know, **Todd**

You have to **show your ticket** and **get your hand stamped** to get in
Grab a stick **lest he attack you**

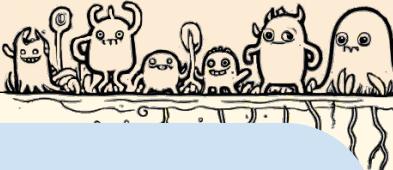
We **ate at home** instead of **going out**
I don't like fish **except salmon**

If you **touch it**, it might **explode**

Even if you only arrive 5 min late, you will be fired

Even though he was broke, he bought a guitar

Relations: attributes



:polarity	Propositional polarity, when marked explicitly	+ , -
:quant	For quantities	<numerals>, X-quantity
:mode	For mode of speech	Interrogative, imperative, expressive
:degree	For intensifiers and downtoners	Intensifier, downturner
:aspect	For propositional aspect	(see lattice)
:refer-person	For use with pronominals	1st, 2nd, 3rd, (see lattice)
:refer-number	For use with pronominals and plural entities	Singular, plural, (see lattice)

:modal-strength	For modal strength and polarity	full-, partial-, neutral-, -affirmative, -negative
:modal-predicate	For connecting a modalized event to its modalizing verb	<variable of modalizing verb>
:quote	For connecting a quotation to the speech predicate	<variable of speech verb>

Participant Roles:

AMR	UMR
:Arg0	:actor
:Arg1	:undergoer
:Arg1	:theme
:Arg0/1	:experiencer
:Arg0	:force
:Arg0	:causer
:Arg0/1	:stimulus
:purpose	:purpose
:instrument	:instrument
:manner	:manner
:extent	:extent
:accompanier	:companion
:location	:place
:beneficiary	:affectee
:time	:temporal
:li	:list-item
:poss	:possessor
:cause	:cause
	:reason
:consist-of	:group
	:material
:source	:source
	:start
:destination	:goal
	:recipient
:mod	:other-role
	:mod

Non-participant Roles:

AMR	UMR
:topic	:topic
:medium	:medium
:path	:path
:direction	:direction
:duration	:duration
:frequency	:frequency
:age	:age
:name	:name
:ord	:ord
:range	:range
:part	:part
:quant	:quant
:degree	:degree
:value	:value
:unit	:unit
:scale	:scale
:example	:example
:polite	:polite
:mode	:mode
:polarity	:polarity
:wiki	:wiki
:concession	:concession
	:concessive-condition
:condition	:condition
and	:pure-addition
or	:apprehensive
instead-of-91	:substitute
except-01	:subtract
say-01	:vocative
:ARG2	

Removed:

AMR
:domain
:subset
:superset
:subevent

---(still used in document annotation)

new roles

unchanged

renamed, semantic
boundaries may be
adjusted

expanded

split roles

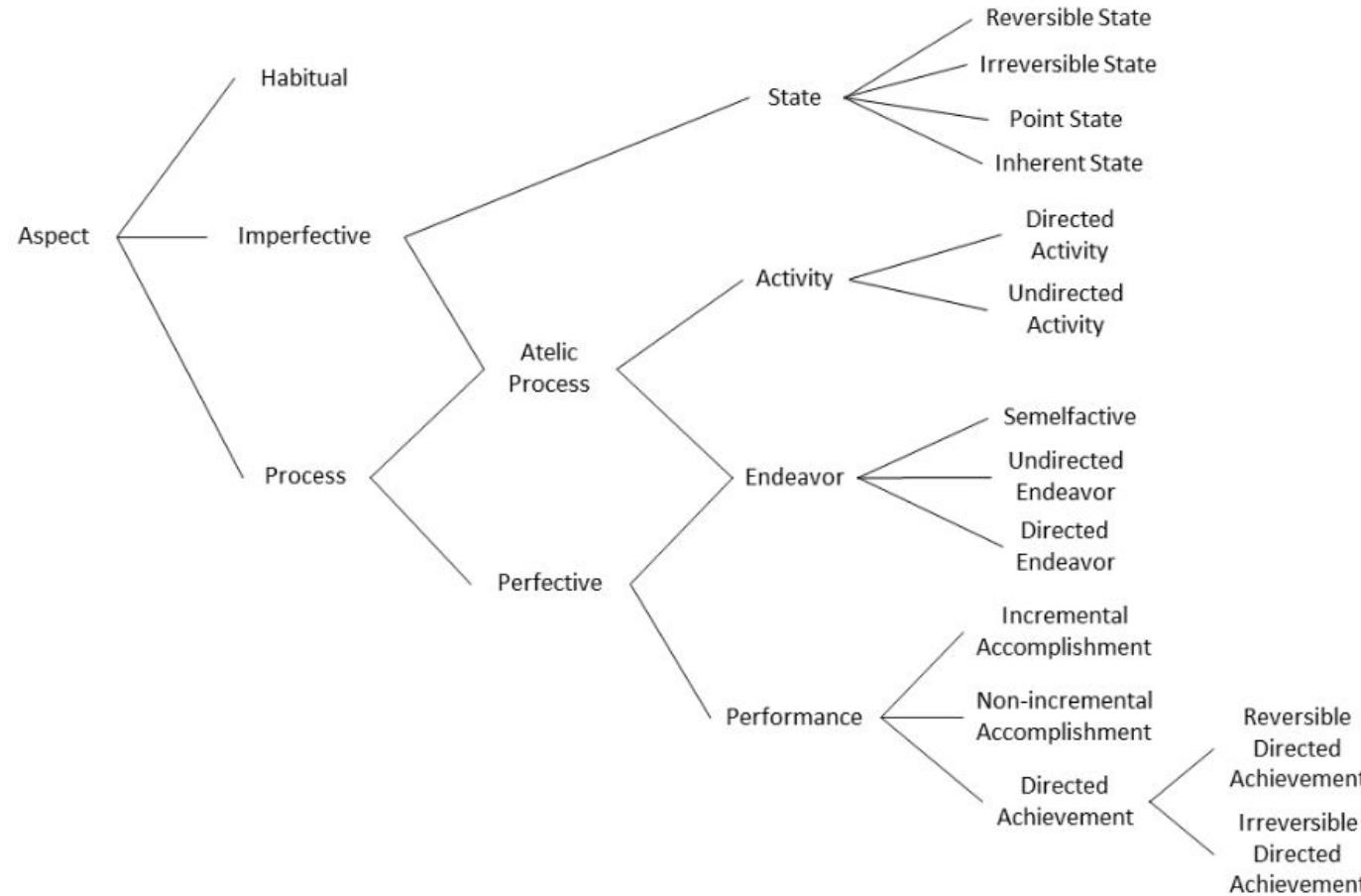
Cheat sheets: Aspect

Aspect values are given in a lattice, with finer-grained and coarser-grained options.

But, there are 6 base levels that you'll see most in English:

1. **State**
2. **Performance**
 - Events that reach a result state:
 - Covers achievements (instantaneous binary change) or accomplishments (where there's a run-up process before the change)
3. **Habitual**
4. **Process**
 - Some kind of ongoing event, beginning/endedness uncertain or unspecified
 - Events expressed as nouns default to this
5. **Activity**
 - Processes that you *know* don't start or end during the time window in question
 - The line between this and Process is really unclear in the guidelines, so don't worry too much about it at this point
6. **Endeavor**
 - A process that ends within the time window in question, but doesn't reach a particular result-state.

Full Aspect Lattice



Full Aspect Lattice

habitual: occurs/occurred usually or habitually

imperfective: ambiguous between state and atelic process

process: unspecified type of process

atelic process: process that does not reach a result state

perfective: process that comes to an end

state: unspecified type of state

reversible state: acquired state that is not permanent

irreversible state: acquired state that is permanent

inherent state: state that is not acquired and permanent

point state: state that is acquired and reversed at a single point in time

activity: process that does not end

undirected activity: process that does not end and does not progress linearly along a scale

directed activity: process that does not end and does progress linearly along a scale

endeavor: process that ends without reaching a result state

semelfactive: process that ends without reaching a result state and happens at a single point in time

undirected endeavor: process that ends without reaching a result state and does not progress linearly along a scale

directed endeavor: process that ends without reaching a result state and progresses linearly along a scale

performance: process that ends and reaches a result state

incremental accomplishment: process that ends and reaches a result state, and progresses linearly along a scale

nonincremental accomplishment: process that ends and reaches a result state, and does not progress linearly along a scale

directed achievement: process that ends and reaches a result state within a single point in time, and progresses linearly along a scale

reversible directed achievement: process that ends and reaches a result state, which is not permanent, within a single point in time, and progresses linearly along a scale

irreversible directed achievement: process that ends and reaches a result state, which is permanent, within a single point in time, and progresses linearly along a scale

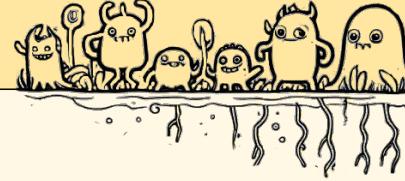
Cheat sheets: Modstr

Mod-strength covers 3 levels of certainty and 2 polarities, for a total of 6 values:

- | | |
|----------------------------|--|
| full-affirmative | - occurrence certain (past/present/future)
- Evidential support (first hand, direct knowledge) |
| partial-affirmative | - occurrence probable, but not certain
- Indirect evidential support (non-1st hand knowledge, inference)
- 'Must have'
- Used for imperatives, suggestions, desideratives, 'may',
'probably' |
| neutral-affirmative | - affirmative but no real certainty of occurrence
- Used for 'might', 'could', 'possibly', ability modals
- Also can be used for questions |
| neutral-negative | |
| partial-negative | (same, but neg) |
| full-negative | |



Schema Elements: capturing meaning

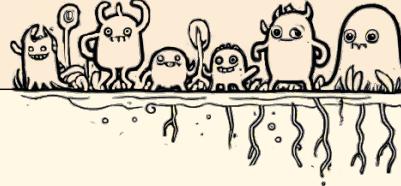


Semantic Concepts: Mostly same as AMR

- Basic concepts:
 - Basic entities
 - Pronominal entities ****new treatment for UMR**
 - Named Entities
- Predicates:
 - Language-specific:
 - Roleset ID or other predicate label ****new annotation without rolesets option**
 - Abstract rolesets:
 - Reifications
 - Discourse relations
 - Nonprototypical predication
 - Other abstract rolesets



Abstract Predicates: reified roles



For each participant role and nonparticipant role

- Rule of thumb: use reified roles if a role is predicated in the language
- Also:
 - If you need a variable for the relation itself
 - If you need to be able to modify a relation itself, rather than its arguments

Update from AMR

- English PropBank rolesets no longer used-- all are -91 rolesets now
- names/IDs streamlined
- Arguments streamlined

(example)

Details - Specialized Predicates

- Reification -91 rolesets:

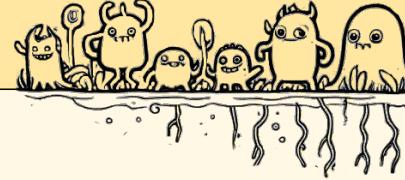
"I am in Macau."

(s1h / have-place-91
 :ARG1 (i / i)
 :ARG2 (c / city
 :name (n / name :op1 "Macau")))

have-place-91 reification of :place
 :ARG1 entity
 :ARG2 location



Annotation Stages: with/without rolesets



Stage 0 annotation

- Languages without a pre-made lexicon of rolesets
- Uses participant roles for predicate arguments

Stage 1 annotation

- Languages with an existing lexicon of rolesets
- Uses rolesets/numbered roles for predicates and arguments

Stages in between will be discussed tomorrow

What is an ‘event’ in UMR?

3. Croft’s Morphosyntax (2022)

	Reference	Modification	Predication
Entities	The sharp <i>thorns</i>	The <i>bush’s</i> thorns	It <i>is a thorn</i>
States	<i>sharpness</i>	The <i>sharp</i> thorns	Those thorns <i>are sharp</i>
Processes	I said [<i>that</i> the thorns <i>scratched</i> me] The [<i>scratching</i> of the thorns]	The thorns <i>that [scratched] me</i> / The thorns [<i>scratching</i> me]	The sharp thorns <i>scratched</i> me.

Information packaging

	Reference	Modification	Predication
Entities	UNMARKED NOUNS	relative clauses, PPs on nouns	predicate nominals, complements
States	deadjectival nouns	UNMARKED ADJECTIVES	predicate adjectives, complements
Processes	event nominals, complements, infinitives, gerunds	participles, relative clauses	UNMARKED VERBS

Things
considered
Events

What does it mean to be an ‘event’?

Being an ‘event’ means:

1. Using a graph predicate (roleset)

- a. -00 suffix or roleset ID
- b. Associated participant roles

Some things that are *not* ‘events’ in UMR terms can also use rolesets...

2. Applying event attributes at sentence level:

- a. :aspect
- b. :modstr

But *only* UMR events get these annotations

3. Getting included in event dependencies at doc-level:

- a. :temporal dependency

Processes in Predication

- **Canonically:** unmarked verbs
- **Always treated as events**

Processes in Predication:		
Graph predicate	yes	Use a roleset (or add -00)
:aspect	yes	
:modstr	yes	
:temporal dep.	yes	

The sharp thorns **scratched** me.

(s1s / **scratch-01**
:ARG0 (s1t / thorn
:refer-number Plural
:mod (s1s2 / sharp))
:ARG1 (s1p / person
:refer-person 1st
:refer-number Singular)
:aspect performance
:modstr full-affirmative)

(s1s0 / sentence
:**temporal** ((DCT :before s1s)))

Processes in Modification and Reference

- Also always treated as events

Processes in Modification & Reference:		
Graph predicate	yes	Use a roleset (or add -00)
:aspect	yes	
:modstr	yes	
:temporal dep.	yes	

The thorns ***that scratched*** me.

(s2t / thorn

:refer-number Plural

:ARG1-of (**s2s / scratch-01**

:ARG1 (s2p / person

:refer-person 1st

:refer-number Singular)

:aspect performance

:modstr full-affirmative))

(s2s0 / sentence

:temporal ((DCT :before **s2s**)))

The ***scratching of*** the thorns

(**s3s / scratch-01**

:ARG0 (s3t / thorn

:refer-number Singular)

:aspect performance

:modstr full-affirmative))

(s3s0 / sentence

:temporal ((DCT :before **s3s**)))

Things that look like processes but aren't:

Artifacts with the same name as events:

- Ex: *instructions* (the act of giving them) event
instructions (the paper manual) not event

Deverbal participant nouns:

- Ex: *driver, governor* *not event, but can be :X-of a roleset

Compounds where a participle form doesn't actually refer to event's occurrence:

- 'Firing squad' *not event, but can be :X-of a roleset
- 'Floating hospitals':
 - If it's a hospital on a boat and it's actively floating at the reference time: event
 - If it's a non-profit organization: not event
 - If it's a boat designed for use as a floating hospital, but it's not actually serving that purpose and it's not floating (e.g., *3 floating hospitals were under construction in the boat yard.*): not event

If so, don't add :aspect,
:modstr, or :temporal
dep.

(s4s / squad
:ARG0-of (s4f / fire-01))

(s4s0 / sentence
:temporal ())

States and Entities in reference and modification:

- **Canonically:** modifying adjectives, possessed kinship terms, etc
- **Not treated as events in general**

States and Entities in Modification and Reference:		
Graph predicate	maybe	Can use sense-appropriate roleset if it exists; Nonprototypical clause rolesets for object predication can still be used
:aspect	no	
:modstr	no	
:temporal dep.	no	

- **Nonprototypical clause rolesets used phrasally:**

object predication	have-role-91	have-role-91
	have-rel-role-92	have-rel-role-92
	have-org-role-92	have-org-role-92

My mother
(s5p / person
:refer-person 3rd
:refer-number Singular
:ARG1-of (s5h / have-rel-role-92
:ARG2 (s5p2 / person
:refer-person 1st
:refer-number Singular)
:ARG3 (s5m / mother))
(s5s0 / sentence
:temporal ())

Exceptions that may still use rolesets:

Some stative nouns:

- *Happiness*:
 - In PB, this is included as an alias of the happy-01 roleset
 - Same arg structure (experiencer/stimulus)
 - Same sense distinction
 - OK to still use the roleset, but don't give it :aspect, :modstr, and :temporal dep. annot.

Non-predicative adjectives:

- Sometimes an adjective can be used both predicatively and non-predicatively
 - Ex: *the hungry man* vs *the man is hungry*
- If you run into a non-predicative instance and there's a roleset, you can still use it-- but don't give it :modstr, :aspect, and :temporal dep. annot.

His happiness was infectious.

(s6i / infect-01
:ARG2 (**s6h / happy-01**
:ARG0 (s6p / person
:refer-person 3st
:refer-number Singular))
:aspect state
:modstr full-affirmative)
(s6s0 / sentence
:temporal ((DCT :overlaps s6i)
()))

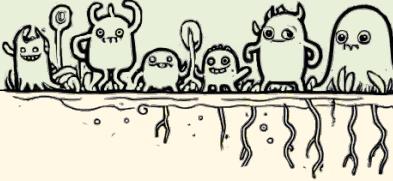
The hungry man

(s7m / man
:ARG1-of (**s7h / hunger-01**)
(s7s0 / sentence
:temporal ()))

The man is hungry.

(**s8h / hunger-01**
:ARG1 (s8m / man)
:aspect state
:modstr full-affirmative)
(s8s0 / sentence
:temporal ((DCT :overlaps **s8h**)))

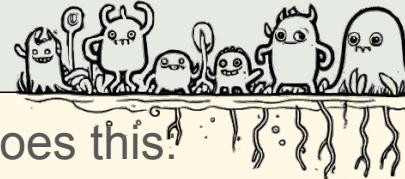
'Events' in UMR



What about the grey area?

- states/properties are tricky
 - Information structure is also syntactic structure-- less abstraction away from syntax than AMR?
 - States in reference and modification:
 - Multiple arguments?
 - Particularization?
- If there's a roleset that fits a sense, you can *always* use it
- Limit :aspect and :modal-strength annotation if a state seems less 'event'-like

Special Phrases: pronouns



- Instead of using the pronoun itself as a graph concept, UMR does this!

- **Head concept:**

- An abstract concept taken from the Named Entity hierarchy.
 - Typically ‘person’ or ‘thing’ or ‘animal’.

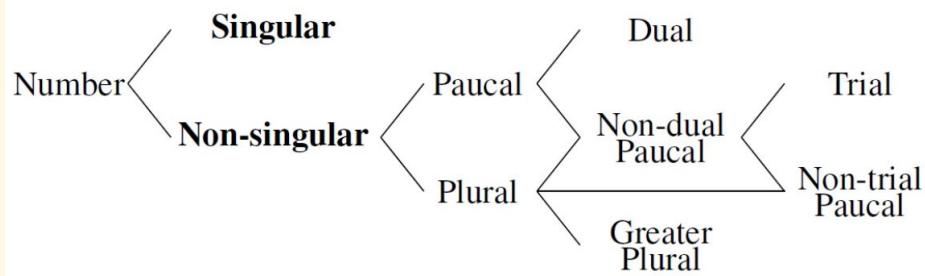
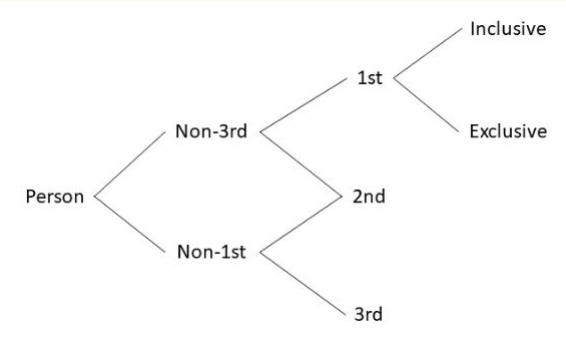
- **:refer-person:**

- Lattice values of different granularity
 - Typically ‘1st’, ‘2nd’ or ‘3rd’

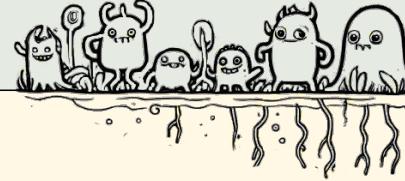
- **:refer-number:**

- Lattice values
 - Typically ‘singular’, ‘plural’ for English
 - Can be used for any concept

- Use for pronouns, pronoun drop, Pronominal indices, etc.



Special Phrases: Named Entities (NEs)



Named Entities annotated much as in AMR, but with updated hierarchy

- Categories aim to be more inclusive of non-western cultures
- Fill in some gaps that existed in the AMR types

Current hierarchy:

- [NE hierarchy spreadsheet](#)

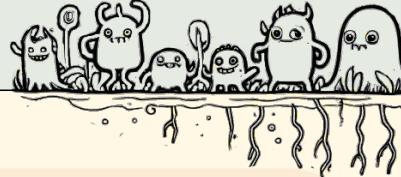
Current list of definitions:

- [NE type definitions, with discussion of current NE decisions under consideration](#)

NE hierarchy in the guidelines will be updated once complete



Special Phrases: quantification & scope



- Mensural constructions

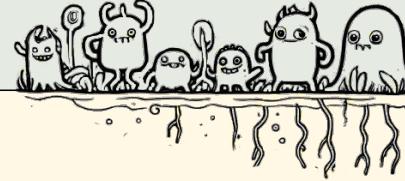


Grumpy Cat likes to eat 3 cheese balls before bed.

(s1l / like-01
:aspect state
:modal-strength full-affirmative
:ARGO (s1a / animal
:name (s1n / name :op1 "Grumpy" :op2 "Cat"))
:ARG1 (s1e / eat-01
:aspect habitual
:modal-strength full-affirmative
:ARG0 s1a
:ARG1 (**s1c2 / cheese**
:unit (s1b / ball)
:quant 3)
:temporal (s1b2 / before
:op1 (s1b3 / bed))
:modal-predicate s1l)



Special Phrases: quantification & scope



Someone didn't answer all the questions

(s1a / answer-01

:ARG0 (s1p / person)

:ARG1 (s1q / question

:quant (s1a2 / all)

:polarity -)

:predicated-of (s1s / scope

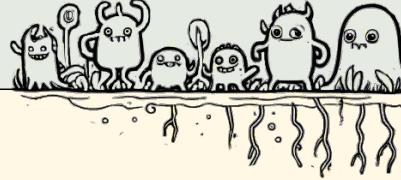
:ARG0 s1p

:ARG1 s1q))

There was a single person who did not answer all of the questions



Special Phrases: dates



- UMR uses special **abstract concepts** we use for **normalizable entities** and **quantities**.

date-entity

:day	:quarter
:month	:dayperiod
:year	:season
:weekday	:decade
:time	:century
:timezone	:calendar
:era	

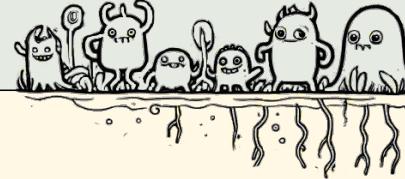
"Tuesday the 19th of May"

(d / date-entity

:weekday (t / tuesday)
:day 19
:month 5)

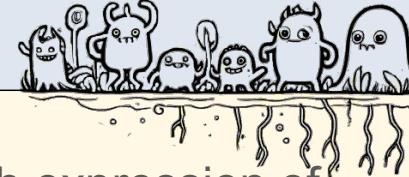


Special Phrases: quantity types



monetary-quantity	:unit dollar, euro, pound, yen, yuan
distance-quantity	:unit meter, kilometer, inch, foot, yard, mile, light-year, kilo-base-pair
area-quantity	:unit square-meter, square-kilometer, square-foot, acre, hectare, square-mile
volume-quantity	:unit liter, cubic-meter, fluid-ounce, pint, gallon, cubic-mile
temporal-quantity	:unit second, minute, hour, day, week, month, year, decade, century
frequency-quantity	:unit hertz
speed-quantity	:unit meter-per-second, mile-per-hour
acceleration-quantity	:unit meter-per-second-squared
mass-quantity	:unit kilogram, ounce, pound, ton, atomic-mass-unit, kilodalton
force-quantity	:unit newton
pressure-quantity	:unit pascal, bar, psi, atmosphere, torr
energy-quantity	:unit joule, calorie, kilowatt-hour, btu, electron-volt
power-quantity	:unit watt, horsepower
charge-quantity	:unit coulomb
potential-quantity	:unit volt
resistance-quantity	:unit ohm
inductance-quantity	:unit henry
magnetic-field-quantity	:unit tesla, gauss
magnetic-flux-quantity	:unit maxwell, weber
radiation-quantity	:unit becquerel, curie, sievert, rem, gray, rad
fuel-consumption-quantity	:unit liter-per-100-kilometer, mile-per-gallon
numerical-quantity	:unit point, mole
information-quantity	:unit bit, byte, kilobyte, megabyte, terabyte, petabyte, exabyte, zettabyte, yottabyte, nibble
concentration-quantity	:unit molar (1M = 1 molar = 1 mole/liter), micromolar (μ M), kilogram-per-cubit-meter, parts-per-million
catalytic-activity-quantity	:unit katal (kat), microkatal, nanokatal, enzyme-unit (U)
acidity-quantity	:scale ph
seismic-quantity	:scale richter
temperature-quantity	:unit degree :scale celsius, kelvin, farenheit
angle-quantity	:unit degree, radian

Special Predicates: nonprototypical predication



Semantic types that are heavily associated, cross-linguistically, with expression of predication through means other than verbs

- UMR aims to annotate these uniformly by their semantics
- This is the one place in UMR where information status (new/old) is recognized

The clausal/phrasal distinction

- Usually in UMR, clausal = roleset, phrasal = role
- Some have associated roles, some don't
 - Why? When the semantics need more than a triple, you need a whole roleset rather than a role regardless of whether the expression is phrasal or clausal

Nonprototypical Predication Rolesets

Semantic type	UMR roleset	Change from AMR	Object predication Sub-rolesets:
Thetic possession	have-91 :Arg1- possessor :Arg2- possession	Renamed have-03, changed arg numbers	have-rel-role-92 :Arg1- first entity :Arg2- relative/acquaintance :Arg3- role of entity A :Arg4- role of relative/acquaintance :Arg5- relationship basis (contract, case, etc)
Predicative possession	belong-91 :Arg1- possesum :Arg2- possessor	Renamed belong-01, changed arg numbers	have-org-role-92 :Arg1- office holder :Arg2- organization :Arg3- title of office held :Arg4- description of responsibility
Thetic location	exist-91 :Arg1- location :Arg2- theme	New roleset, not the same as exist-01. Exist-01 was not used for this in AMR, it was only lemma-specific.	**note shifted arg numbers compared to AMR rolesets, which is the motivation for shifting the roleset id for these to -92.
Predicative location	have-location-91 :Arg1- theme :Arg2- location	New roleset, separate from have-place-91, with some but not total overlap with be-located-at-91.	
Property prediction	have-mod-91 :Arg1- entity :Arg2- mod	(unchanged)	
Object predication	have-role-91 :Arg1- first entity :Arg2- optional second entity :Arg3- object category for arg1 :Arg4 -optional object category for arg2	Have-org-role-92 and have-rel-role-92 are subtypes. Use where appropriate. (both are same as in AMR, but with arg numbers shifted)	
Equational	identity-91 :Arg1- theme :Arg2- equated referent	New roleset, not the same as identical-01. Identical-01 was not used for this purpose in AMR-- it was only lemma-specific.	

Details - Specialized Rolesets

- Other **complex relations** are also given special **abstract rolesets**:
 - ex: organizational/employment roles

"The US president"

(s1p / person

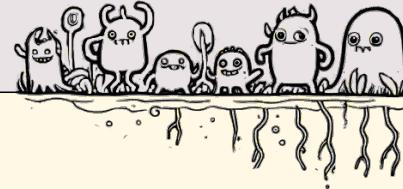
:ARG1-of (s1h / have-org-role-92
:ARG2 (s1c / country
 :name (s1n / name :op1 "US")
 :wiki "United_States")
:ARG3 (s1p2 / president)))

have-org-role-92

:ARG1 *office-holder*
:ARG2 *organization*
:ARG3 *title of office held*
:ARG4 *description of responsibility*



Special Annotation: discourse relations



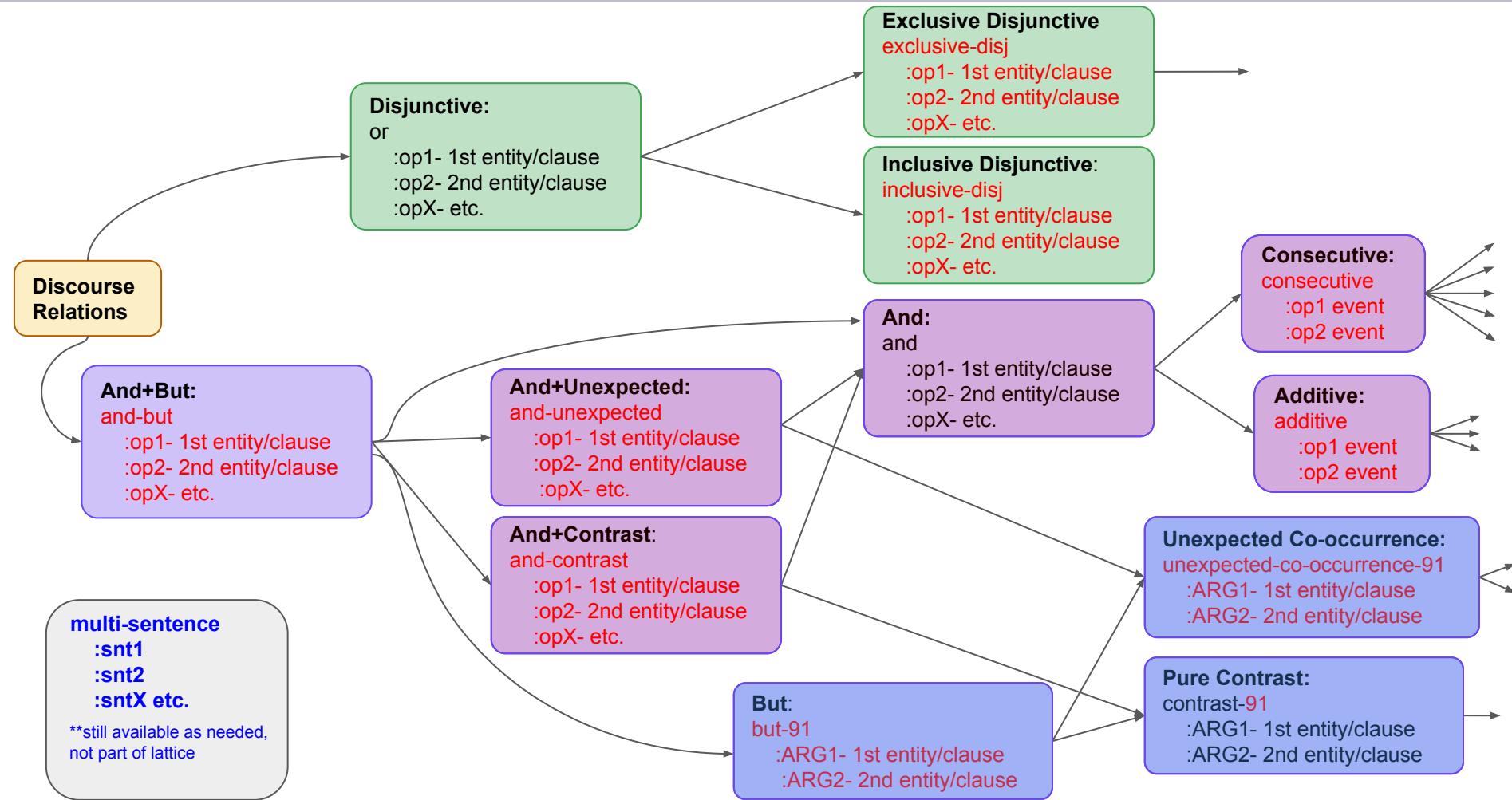
Inter-clausal

Possible forms:

- Relations with any number of interchangeable arguments:
 - Concept + :op1 ... :opN
- Relations with a fixed number of non-interchangeable arguments:
 - Abstract roleset
 - Role

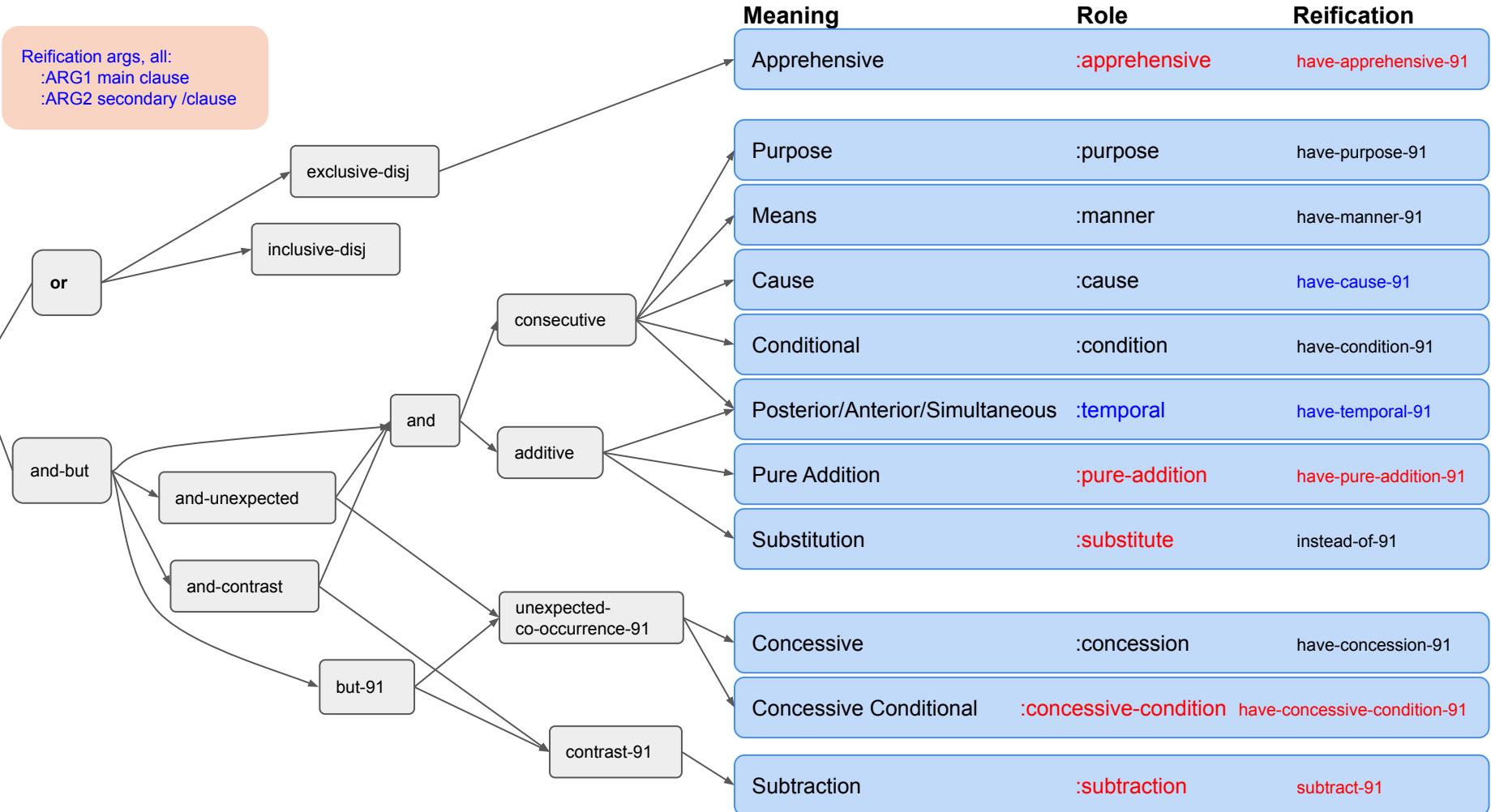
(show the DR slides)

Discourse Relations Strategies: all upper levels; all are concept frames with multiple :op args, or rolesets with 2 args. New in red

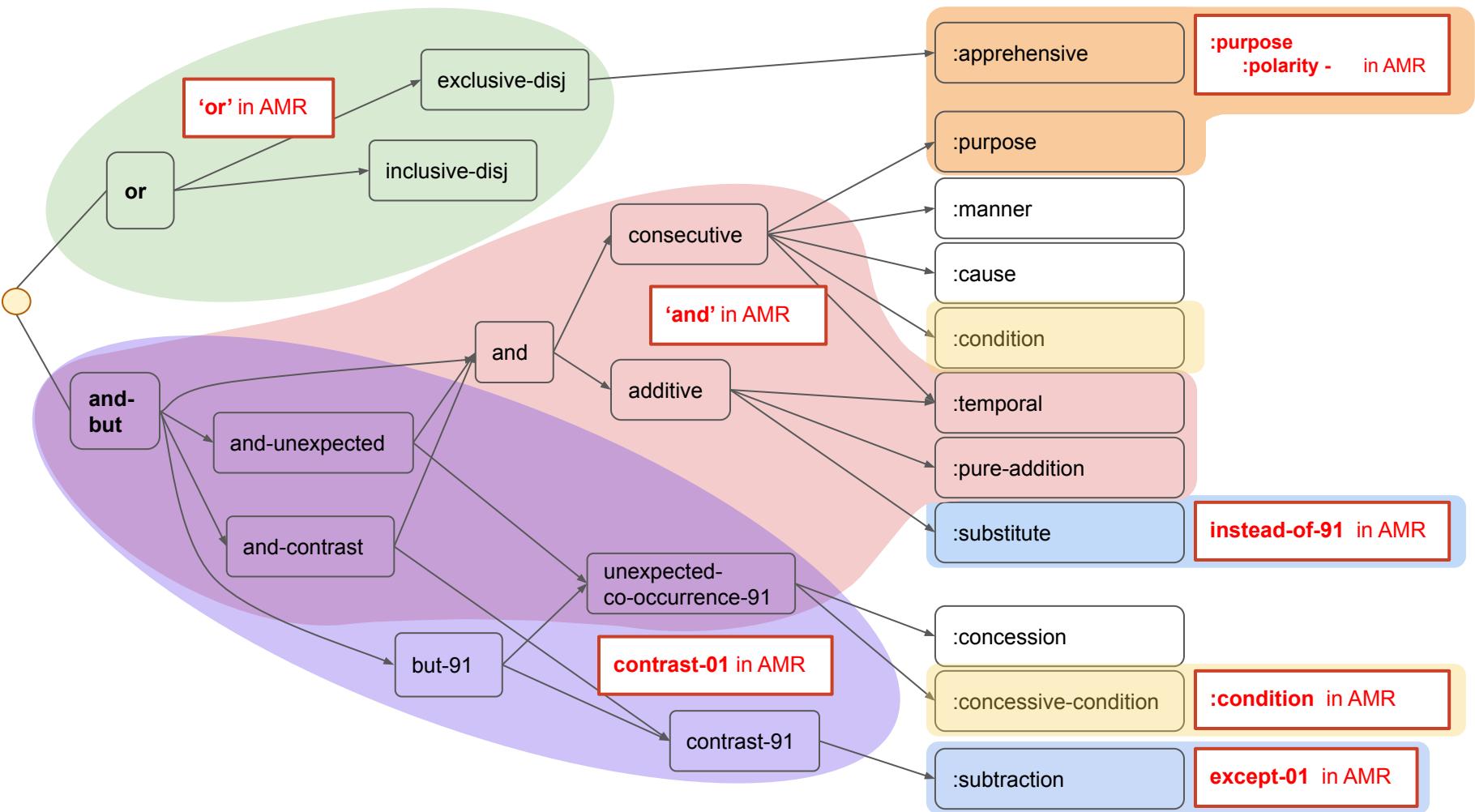


Discourse Relations Strategies: lower level; all are roles with associated reified rolesets. New in red, adjusted roleset name in blue

Reification args, all:
 :ARG1 main clause
 :ARG2 secondary /clause



Discourse Relations concept coverage in AMR vs UMR



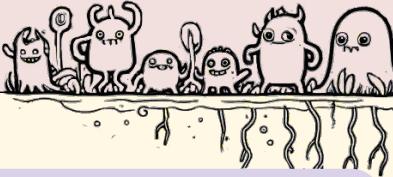
Upper Levels: Abstract Concepts/Rolesets

Meaning	Concept/Roleset	Roles
DISJUNCTIVE	or	:op1, :op2, :opX
EXCLUSIVE DISJUNCTIVE	exclusive-disj	:op1, :op2, :opX
INCLUSIVE DISJUNCTIVE	inclusive-dis	:op1, :op2, :opX
AND + BUT	and-but	:op1, :op2, :opX
AND	and	:op1, :op2, :opX
CONSECUTIVE	consecutive	:op1, :op2, :opX
ADDITIVE	additive	:op1, :op2, opX
AND + UNEXPECTED	and-unexpected	:op1, :op2, :opX
AND + CONTRAST	and-unexpected	:op1, :op2, :opX
BUT	but-91	:ARG1, :ARG2
UNEXPECTED CO-OCCURRENCE	unexpected-co-occurrence-91	:ARG1, :ARG2
PURE CONTRAST	contrast-91	:ARG1, :ARG2

Lower Levels: Roles & Reification Rolesets

Meaning	Relation	Reification	Roles
APPREHENSIVE	:apprehensive	have-apprehensive-91	:ARG1, :ARG2
PURPOSE	:purpose	have-purpose-91	:ARG1, :ARG2
MEANS	:manner	have-manner-91	:ARG1, :ARG2
CAUSE	:cause	have-cause-91	:ARG1, :ARG2
CONDITIONAL	:condition	have-condition-91	:ARG1, :ARG2
POSTERIOR			
ANTERIOR	:temporal	have-temporal-91	:ARG1, :ARG2
SIMULTANEOUS			
PURE-ADDITION	:pure-addition	have-pure-addition-91	:ARG1, :ARG2
SUBSTITUTION	:substitute	Instead-of-91	:ARG1, :ARG2
CONCESSIVE	:concession	have-concession-91	:ARG1, :ARG2
CONCESSIVE-CONDITIONAL	:concessive-condition	have-concessive-condition-91	:ARG1, :ARG2
SUBTRACTION	:subtraction	have-subtraction-91	:ARG1, :ARG2

Special Predicates: abstract rolesets from AMR



byline-91 for image captions, attributions

:ARG1 news organization
:ARG2 author
:ARG3 photographer, illustrator
:ARG4 translator
:ARG5 means

cite-91 for citations in-line

:ARG1 text accompanied by a citation
:ARG2 source publication (probably use publication-91)

correlate-91 for 'the Xer, the Yer' construction

:ARG1 X; first item changing in relation to another
:ARG2 Y; second item ARG1 is changing in relation to

course-91 for school course labels

:ARG1 topic
:ARG2 number
:ARG3 section
:ARG4 institution
:ARG5 instructor

distribution-range-91 for statistical notations

:ARG1 center, mean
:ARG2 lower bound
:ARG3 upper bound
:ARG4 radius, distance from center to bounds
:ARG5 confidence that value is in range, typically a %
:ARG6 deviation covered by range, e.g.
standard-deviation, standard-error-of-mean
:ARG7 type of distribution, e.g. normal-distrib

include-91 for set/member relationships ('some of the cats' ...)

:ARG1 subset
:ARG2 superset
:ARG3 relative size of sub to super

infer-91 for inferences that don't fall under :reason

:ARG1 inference-maker
:ARG2 belief
:ARG3 source of belief



Special Predicates: abstract rolesets from AMR



have-degree-91 for degree constructions with more args

:ARG1 entity characterized
:ARG2 attribute (e.g., tall)
:ARG3 degree itself (e.g., more, most, less least, times,
equal, enough, too, so, at-least)
:ARG4 compared-to
:ARG5 superlative, reference to superset
:ARG6 reference, threshold of sufficiency

hyperlink-91 for hyperlinks

:ARG1 text being hyperlinked
:ARG2 url-entity

score-on-scale-91 for '5 out of 10 on my social studies test'

:ARG1 score
:ARG2 worst score on scale
:ARG3 best score on scale

rate-entity-91 for '3 times a week' type things

:ARG1 quantity (with an implied default of 1)
:ARG2 per quantity
:ARG3 regular interval between events
:ARG4 entity on which recurring event happens

publication-91 for article titles, references, etc.

:ARG0 author(s)
:ARG1 title
:ARG2 abstract
:ARG3 full text
:ARG4 venue (journal, conference, etc.)
:ARG5 volume
:ARG6 issue
:ARG7 pages
:ARG8 id (e.g., PubMed)
:ARG9 editor(s)

resemble-91 for similitive constructions

:ARG1 the copy
:ARG2 the original

statistical-test-91 for more statistical methods

:ARG1 finding
:ARG2 p-value (probability of null hypothesis)
:ARG3 r-squared (coefficient of determination)
:ARG4 significance test (e.g., t-test, Chi-square test,
Fisher's exact test)
:ARG5 alternative hypothesis (vs...)



Special Predicates: abstract rolesets from AMR

**street-address-91** for addresses

- :ARG1 street-number
- :ARG2 street
- :ARG3 unit (apartment, suite, etc.)
- :ARG4 city
- :ARG5 state, province, district
- :ARG6 zip code
- :ARG7 country

mean-91 for various expressions of error correction, etc.

- :ARG0 agent
- :ARG1 element containing meaning
- :ARG2 meaning
- :ARG3 perceiver, beneficiary

have-experience-91 for experiences that don't have rolesets

- :ARG1 experiencer
- :ARG2 experience
- :ARG3 stimulus

weather-91 for weather constructions without rolesets

- :ARG1 location
- :ARG2 environmental condition

range-91 for 'he ruled from the east coast to the west'

- :ARG1 start of the range
- :ARG2 end of the range

gesture-91 for transcription of gestures, especially when they have a syntactic role in the sentence

- :ARG0 gesturer
- :ARG1 the gesture
- :ARG2 audience

emit-sound-91 for transcription of noises, noise imitations

- :ARG1 entity emitting sound
- :ARG2 the sound (may use (s / string-entity))

proverb-91 for proverbs and 2-part allegories

- :ARG1 proverb
- :ARG2 2nd part of a 2-part allegorical expression

Details - Specialized Normalizations

- And special **abstract rolesets** we can use for more complex **normalizable entities**.

“\$2/taco Tuesdays”

(r / rate-entity-91

:ARG1 (m / monetary-quantity

:unit dollar

:quant 2)

:ARG2 (t / taco

:quant 1)

:ARG4 (d / date-entity

:weekday (t / tuesday))

rate-entity-91

:ARG1 *quantity (implied default 1)*

:ARG2 *per quantity*

:ARG3 *regular interval between events*

:ARG4 *entity on which recurring event happens*

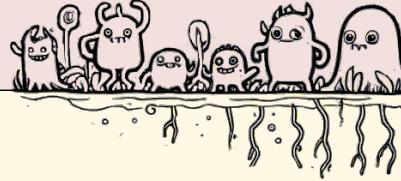
Special Predicates: new for UMR

- weather-91
- have-experience-91
- emit-sound-91
- range-91
- gesture-91
- proverb-91
- etc





Special Predicates: new for UMR



... and he goes . . you know {brushing gesture} and then you see three other boys about his age .

(s83a / and
:op1 (s83g / go-05
:ARG0 (s83p / person
:refer-person 3rd
:refer-number Singular)
:ARG1 (s83g2 / gesture-91
:ARG0 s83p
:ARG1 (s83b / brush-off-04))
:Aspect Endeavor
:MODSTR FullAff)

:op2 (s83s / see-01
:ARG0 (s83p2 / person
:refer-person 2nd
:refer-number Singular)

:ARG1 (s83b2 / boy
:quant 3
:mod (s83o / other)
:ARG1-of (s83h / have-age-91
:ARG2 (s83a2 / about
:op1 (s83t / temporal-quantity
:ARG2-of (s83h2 / have-age-91
:ARG1 s83p))))

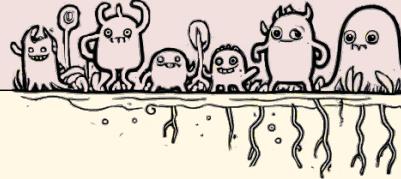
:Aspect State
:temporal (s83t3 / then)
:MODSTR FullAff))

(s83s0 / sentence
:temporal ((s83g :after s83s))
:modal ((ROOT :MODAL AUTH)
 (AUTH :FullAff s83g)
 (AUTH :FullAff s83s))
:coref ((s82b :same-event s83g)
 (s82p :same-entity s83p)
 (s80p :same-entity s83p2)))

alignment:
s83a: 0-0
s83a2: 19-19
s83b: 10-10
s83b2: 18-18
s83g: 5-5
s83g2: 6-6
s83o: 17-17
s83p: 4-4
s83p2: 14-14
s83s: 15-15
s83t: 0-0
s83t3: 13-13



Special Predicates: new for UMR



You know ,

(s121k / know-01
:aspect State
:modal-strength full-affirmative
:ARG0 (s121p / person
:refer-person 2nd
:refer-number singular)
:ARG1 (s121t / thing))

with a ball on ay uh /??/ ?

(s122t / thing
:part (s122b / ball
:refer-number Singular))

... chong chong chong chong .

(s123e / emit-sound-91
:ARG1 (**s123t** / thing)
:ARG2 (s123a / and
:op1 (s123s / string-entity :value "chong")
:op2 (s123s2 / string-entity :value "chong")
:op3 (s123s3 / string-entity :value "chong")
:op4 (s123s4 / string-entity :value "chong"))

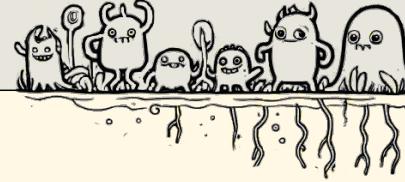
(s121s0 / sentence
:temporal ((s120c :overlap s121k))
:modal ((ROOT :MODAL AUTH)
 (AUTH :FullAff s121k))
:coref ((s118p :same-entity s121p)))

(s122s0 / sentence
:coref ((s121t :same-entity s122t)))

(s123s0 / sentence
:coref ((**s122t** :same-entity **s123t**)))



Special Dialogue Strategies: vocatives



I said no, Mary!

(s1s / say-01

:aspect performance

:modal-strength full-affirmative

:ARG0 (s1p / person

:refer-person 1st

:refer-number singular)

:ARG1 (s1n / no

:vocative (s1p2 / person

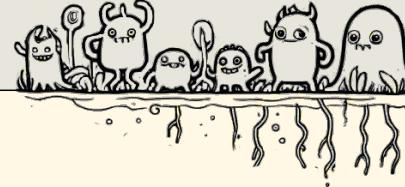
:name (s1n / name :op1 “Mary”))

:quote s1s)

:ARG2 s1p2



Special Dialogue Strategies: quotes



I said no, Mary!

(s1s / say-01

:aspect performance

:modal-strength full-affirmative

:ARG0 (s1p / person

:refer-person 1st

:refer-number singular)

:ARG1 (s1n / no

:vocative (s1p2 / person

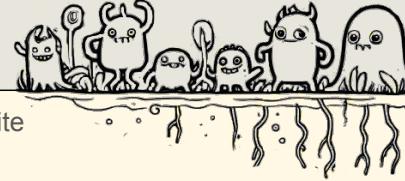
:name (s1n / name :op1 “Mary”))

:quote s1s)

:ARG2 s1p2



Special Dialogue Strategies: quotes



About 14,000 people fled their homes at the weekend after a local tsunami warning was issued, the UN said on its Web site

(s6s / say-01

:aspect performance
:modal-strength full-affirmative
:ARG0 (s6i / international-organization :wiki "United_Nations"
:name (s6n / name :op1 "UN"))

:ARG1 (s6f / flee-05

:aspect performance
:modal-strength full-affirmative
:ARG0 (s6p / person
:quant (s6a / about :op1 14000))

:ARG1 (s6h / home

:refer-number plural
:possessor s6p)

:temporal (s6w / weekend)

:temporal (s6a2 / after

:op1 (s6w2 / warn-01

:aspect performance
:modal-strength full-affirmative
:ARG1 (s6t / tsunami-01

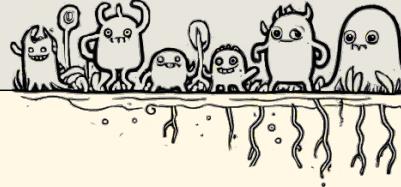
:aspect performance

:modal-strength neutral-affirmative)
:ARG1-of (s6l / local-02)))

:quote s6s)

:medium (s6s2 / site
:possessor s6i
:medium (s6w3 / web)))

Special Dialogue Strategies: dialogue speech



Marsha , did the Presidential Pardons Commission give any reason for their decision ?

(s6s / say-01

:ARG0 (s6p2 / person)
:ARG1 (s6g / give-01
:ARG0 (s6g2 / government-organization :wiki -
:name (s6n2 / name :op1 "Presidential" :op2 "Pardons" :op3 "Commission"))
:ARG1 (s6r / reason
:reason-of (s6d / decide-01
:ARG0 s6g2
:topic (s6t / thing)
:aspect performance
:modal-strength full-affirmative)
:mod (s6a / any))
:mode interrogative
:polarity (s6u / umr-unknown)
:vocative (s6p / person :wiki -
:name (s6n / name :op1 "Marsha"))
:aspect performance
:modal-strength neutral-affirmative
:quote s6s)
:ARG2 s6p)

alignment:
s6g: 8-8
s6g2: 5-7
s6n2: 0-0
s6r: 10-10
s6d: 13-13
s6a: 9-9
s6u: 0-0
s6p: 1-1
s6n: 0-0
s6s: 0-0
s6p2: 0-0
s6t: 0-0