RECAP: AMR vs UMR

"The president pardoned him for health reasons."

AMR

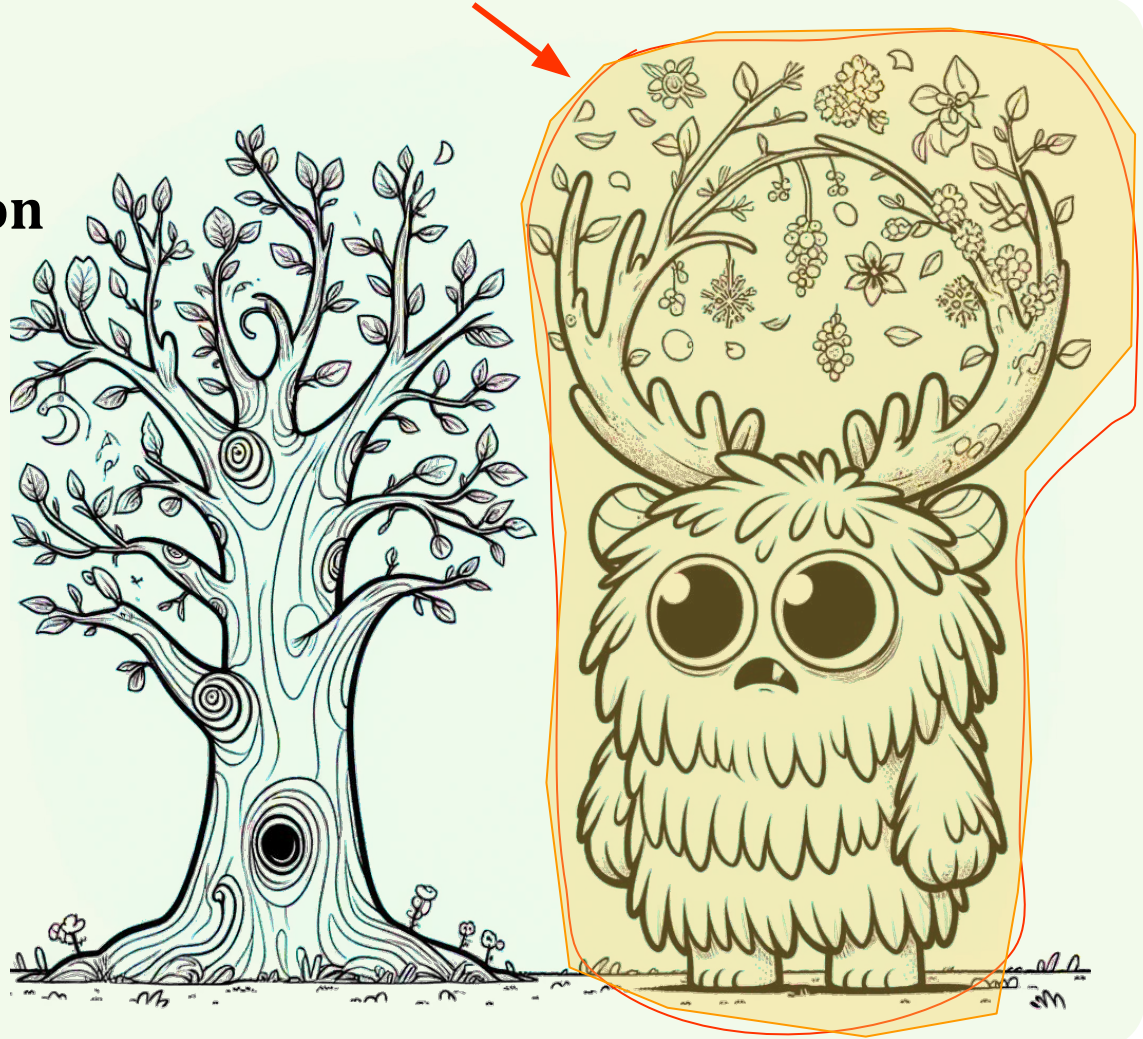
```
(p / pardon-01
    :Arg0 (p2 / president)
    :Arg1 (h2 / he)
    :Arg1-of (c / cause-01
        :Arg0 (r / reason
            :mod (h / health))))
```

UMR

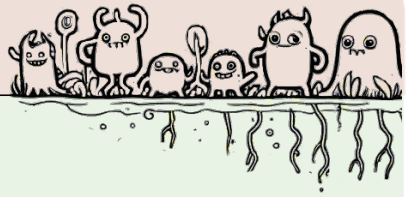
```
(s2p / pardon-01
    :Arg0 (s2p2 / president)
    :Arg1 (s2p3 / person
        :refer-person 3rd
        :refer-number singular)
    :reason (s2h / health)
    :aspect performance
    :modal-strength full-affirmative)

(s1 / sentence
    :coref (s2p :same-entity s1p)
    :temporal ((dct :before s1p))
    :modal ((auth :full-affirmative s1p))
```

UMR Part 2

Document-level Annotation

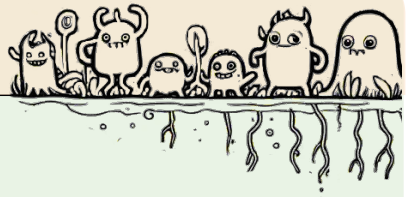


Document Graph Structure



```
(sNs0 / sentence
      :temporal (((B :relation A)
                  (D :relation C))
      :modal (((F :relation E)
               (H :relation G))
      :coref (((J :relation I)
               (L :relation K)))
```

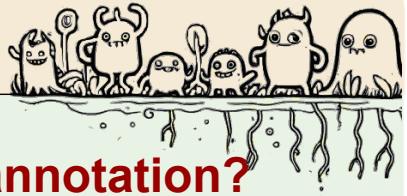
Temporal Dependency



What relations/roles are used in doc-level temporal annotation?

- **:depends-on**
  - Used for deictic expressions like ‘today’ that rely on some time expression or document time to understand them.
  - Interpretation of ‘A depends on B’:
    :temporal (B :depends-on A)
- **:after**
  - A occurs after B:
    :temporal (B :after A)
- **:before**
  - A occurs before B:
    :temporal (B :before A)
- **:overlap**
  - A and B partially or fully overlap each other-- no more info specified
    :temporal (B :overlap A) or (A :overlap B) -- there’s no difference
- **:contained**
  - A is contained in B, fully (can share a boundary):
    :temporal (B :contained A)

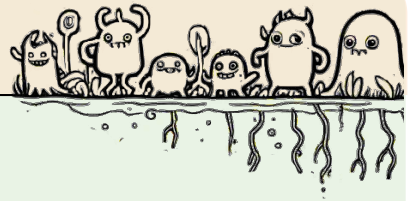
Temporal Dependency



What concepts in a sentence/graph get a doc-level :temporal annotation?

- **Every UMR ‘event’**
  - That is, every graph element representing *predication*
  - In other words, every event/state roleset in the graph
    - This includes -91 rolesets if the -91 roleset is being used as the main predicate to express a clause.
- **Every time expression**
  - *June 8, tomorrow, nowadays, last week,* etc.

Temporal Dependency



What can you use as arguments of the doc-level temporal relations?

1. **Graph variables:**
   - For events
   - For time expressions

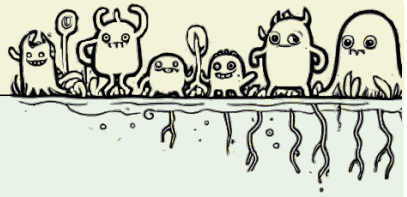
2. **Fixed concepts:**
   - **DCT:**
     - Document Creation Time
     - Commonly used in the first sentence of a document to establish tense of first event
   - **PAST_REF**

     PRESENT_REF

     FUTURE_REF

     - Each of these can be used for vague expressions like ‘nowadays’.
     - Have seen these come up very little, honestly

Coreference Dependency



**Coref relations read right-to-left.

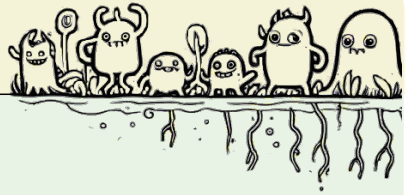
What concepts in a sentence/graph get a doc-level :coref annotation?

- **Events**
- **Entities**

What counts as coreference?

- **Any multiple references to the same entity or event, across sentences, regardless of how the reference is expressed:**
  - Pronouns
  - Differently worded descriptions
  - Same mentions
  - Implicit arguments
- **Subset relations (but not part/whole)**
  - For events and states

Coreference Dependency



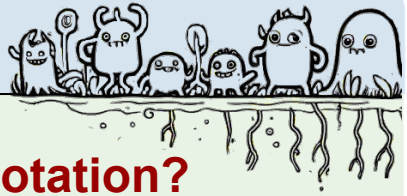
What relations/roles are used in doc-level coref annotation?

- :same-entity
- :same-event
- :subset-of

What can you use as arguments of the doc-level modal relations?

- Graph variables
  - Usually, the arg on the **right** is the variable from the current sentence
  - And the arg on the **left** is the variable from the most recent previous sentence in which the entity/event appears

Modal Dependency



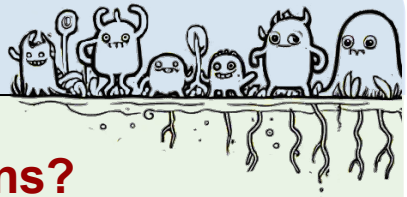
What concepts in a sentence/graph get a doc-level :modal annotation?

- Every instance of :modal-strength in the sentence graph gets expanded automatically at the doc level

What relations/roles are used in doc-level modal annotation?

- :modal-strength values from the sentence graph become roles at the doc-level
  - A :fullaff B

Modal Dependency



What can you use as arguments of the doc-level modal relations?

- **On the left:**
  - This is the entity who asserts the modal strength of the event
  - Use:
    - AUTH to refer to the author of the document
    - Graph variables for entities who are the source of the information
- **On the right:**
  - Graph variable for the event whose modality is being annotated

(s1g / go-02
:modstr full-affirmative)

→ :modal ((AUTH :full-affirmative s1g))

EVENTS in UMR

What is an ‘event’ in UMR?

3. Croft’s Morphosyntax (2022)

	Reference	Modification	Predication
Entities	The sharp ***thorns***	The ***bush’s*** thorns	It ***is a thorn***
States	***sharpness***	The ***sharp*** thorns	Those thorns **are sharp**
Processes	I said [***that*** the thorns ***scratched*** me] The [***scratching*** of the thorns]	The thorns ***that*** [***scratched*** me]/ The thorns [***scratching*** me]	The sharp thorns ***scratched*** 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’ in UMR?

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

3. **Getting included in event dependencies at doc-level:**
   a. :temporal dependency

But *only* UMR events get these annotations

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 **:temporal dep.**	yes 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 :temporal dep.	no 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)
               ()))
```

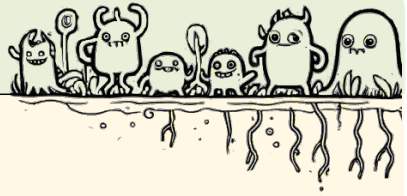
*The **hungry** man*

```
(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

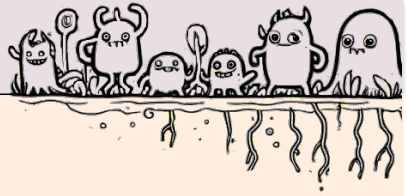


What about the grey area?

- 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

UMR Annotation workflow



Sentence-level annotation:

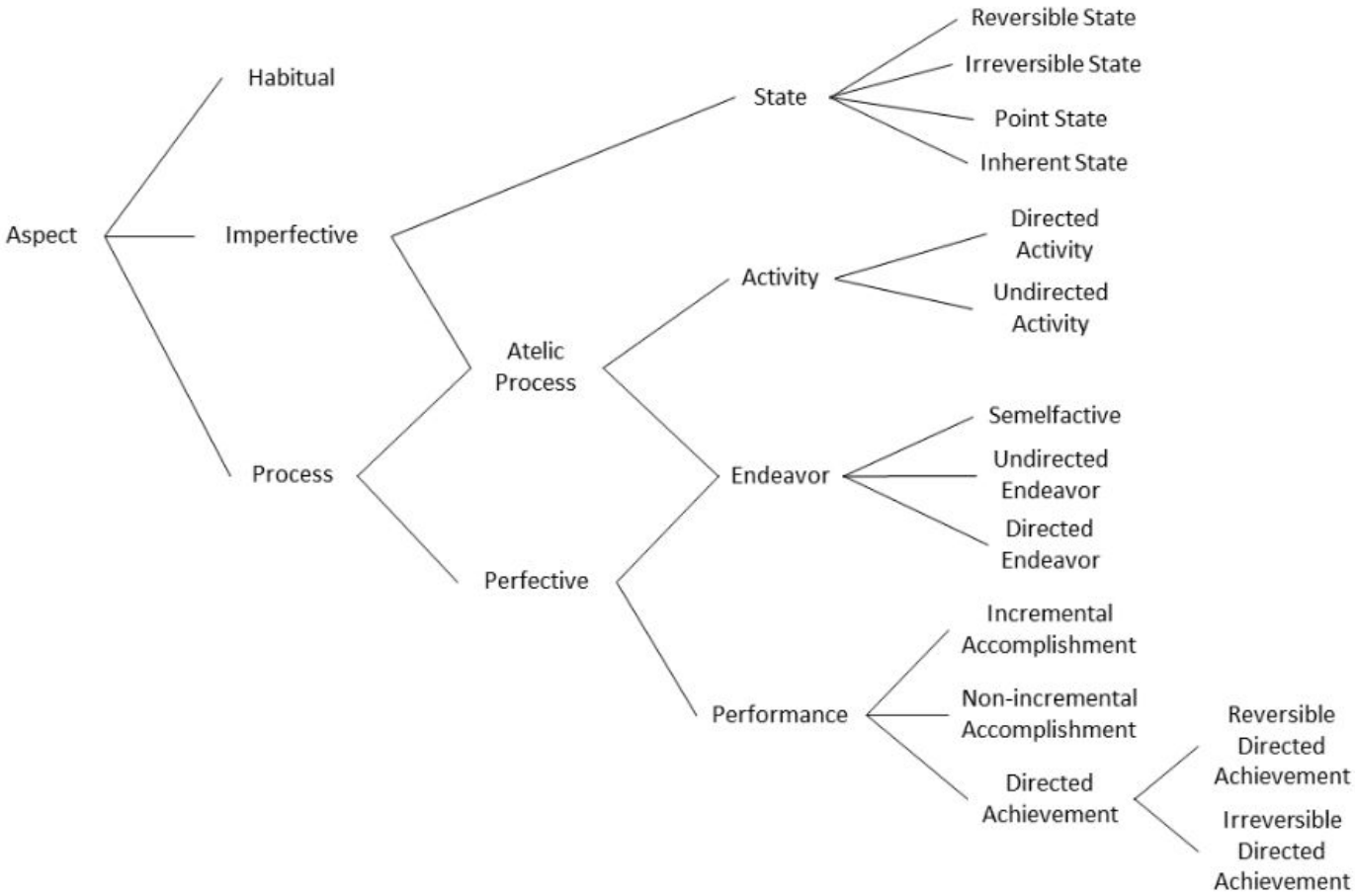
- AMR-like base graph
- :aspect
- :modal-strength (was called :MODSTR before)
- :modal-predicate (was called :MOD or :MODPRED before)
- :quote (was called :QUOT before)

Sentence-level annotation:

- :temporal (annotation of tense, timeline)
- :modal
- :coreference

ASPECT

Full Aspect Lattice



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

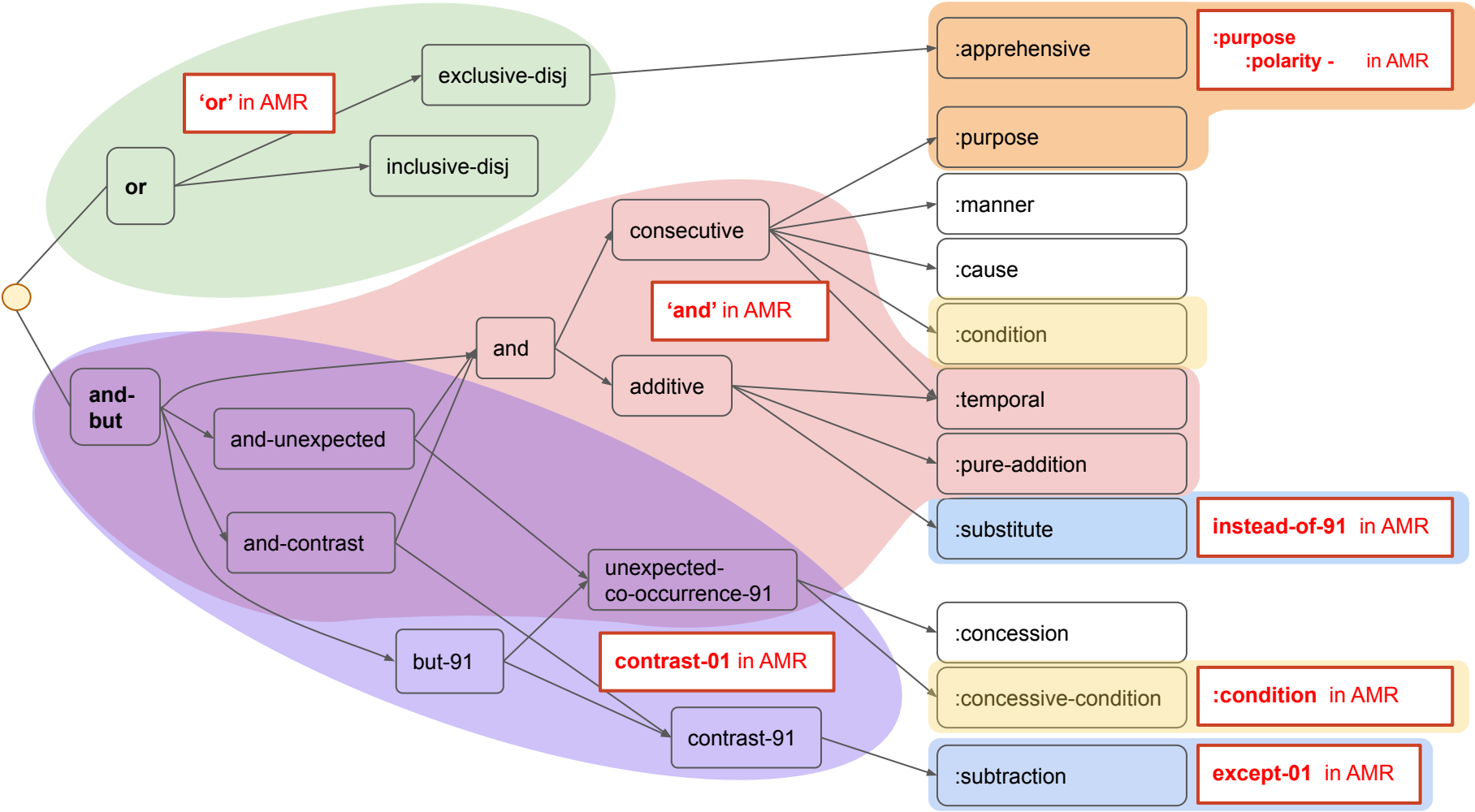
`habitual`: occurs/occurred usually or habitually
`imperfective`: ambiguous between state and atelic process
`process`: unspecified type of process

`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

DISCOURSE RELATIONS

Discourse Relations concept coverage in AMR vs UMR



Details - Discourse Connectives and Coordination

- For **two-place** discourse connectives, we define **abstract rolesets**

"We walked home even though it was raining."

```
(h / have-concession-91
    :ARG1 (w / walk-01
        :ARG0 (w2 / we)
        :destination (h / home))
    :ARG2 (r / rain-01))
```

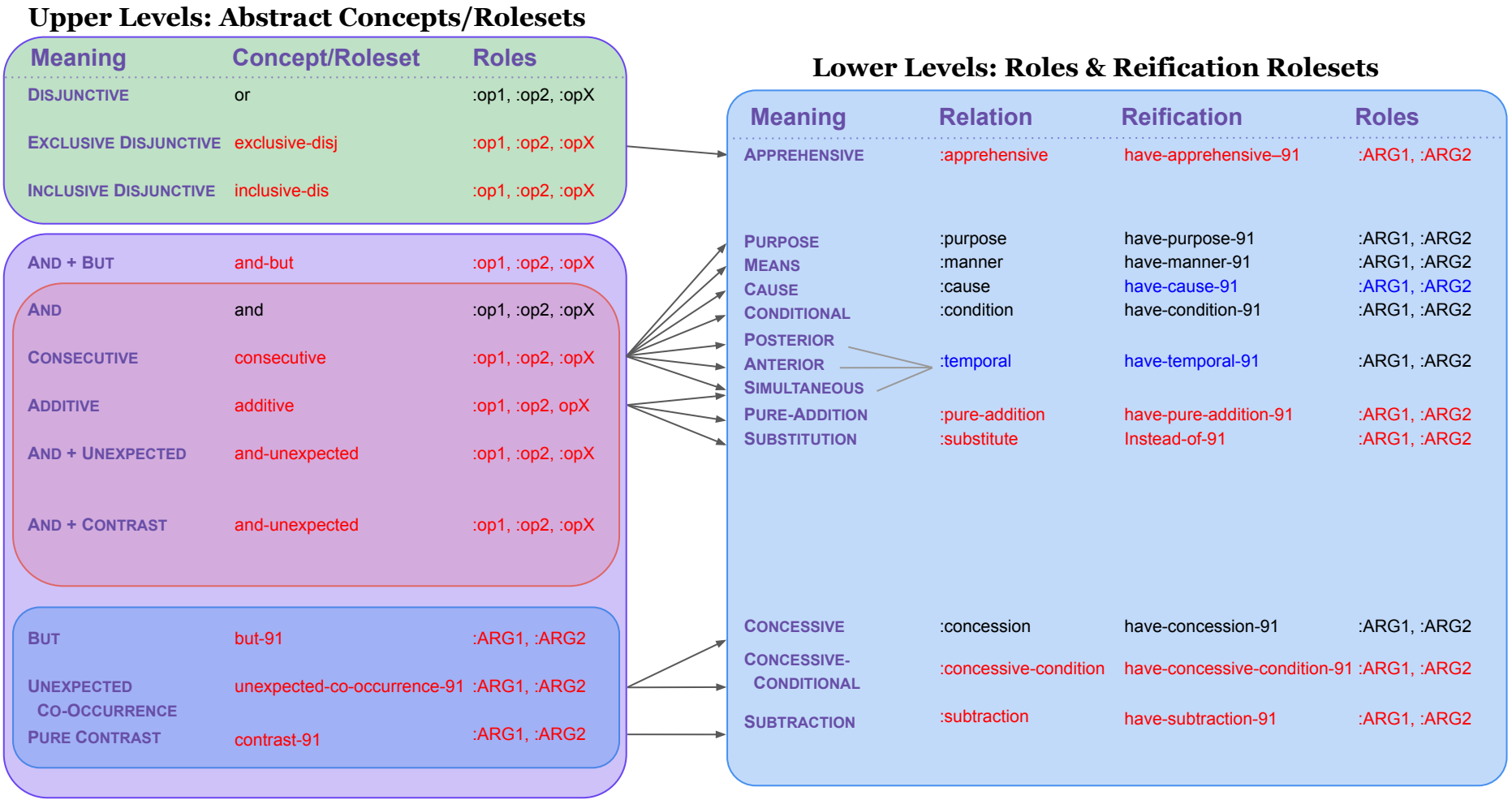
have-concession-91
:ARG1 *main clause*
:ARG2 *'although' clause*

- For **list-like** discourse connectives, we use an **abstract concept** with any number of sequential **:op** roles:

"apples and bananas"

```
(a / and
    :op1 (a2 / apple)
    :op2 (b / banana)
```

and
:op1 *1st thing*
:op2 *2nd thing*
:op3 *3rd thing*
(etc.)


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
SIMULTANEOUS
:temporal
have-temporal-91
:ARG1, :ARG2
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

Disjunctive relations:

Meaning	Concept/Roleset	Definition	Example
DISJUNCTIVE	(o / or)	Construes two (or more) events or entities as being alternatives of each other in some way.	*I will go for a walk **or** play some soccer.*
EXCLUSIVE DISJUNCTIVE	(e / exclusive-disj)	Indicates that either any of the construed alternatives can be chosen individually or in combination.	*If we go down to a 'crazy place' to bash pandanus, husk and eat corn, **or** plant bananas, we don't sleep with women.*
APPREHENSIVE	:apprehensive	Two events are mutually exclusive alternatives, but more specifically, one event is carried out with the intention of preventing the other event from happening.	*Grab a stick **lest** he attack you!*
INCLUSIVE DISJUNCTIVE	(i / inclusive-dis)	Indicates that the construed alternatives are presented as mutually exclusive options.	*You can have coffee **or** tea, but not both.*

Conjunctive relations: ‘and’ & ‘but’

Meaning	Concept/Roleset	Definition	Example
AND	(a / and)	Construes two (or more) events or entities as being alternatives of each other in some way.	*I will go for a walk **or** play some soccer.*
AND + UNEXPECTED	(a / and-unexpected)	Indicates that either any of the construed alternatives can be chosen individually or in combination.	*If we go down to a ‘crazy place’ to bash pandanus, husk and eat corn, **or** plant bananas, we don’t sleep with women.*
AND + CONTRAST	(a / and-contrast)	Two events are mutually exclusive alternatives, but more specifically, one event is carried out with the intention of preventing the other event from happening.	*Grab a stick **lest** he attack you!*
UNEXPECTED CO-OCCURRENCE	(u / unexpected-co-occurrence-91)	Indicates that the construed alternatives are presented as mutually exclusive options.	*You can have coffee **or** tea, but not both.*
CONCESSION	:concession	Expresses a relation between two events towards which the speaker has a positive epistemic stance (i.e. the speaker believes they both occurred/will occur), but specifies that this co-occurrence is unexpected.	***Even though** he was broke, he bought a new guitar.*
CONCESSIVE CONDITIONAL	:concessive-condition	Expresses that the state of affairs described in the apodosis will be true under the entire range of conditions described in the protasis. These are different from regular conditionals in that they imply an expectation that the event expressed in the protasis may not lead to the event expressed in the apodosis happening.	***Even if** you arrive only 5 minutes late, you will be fired.*
NEGATIVE CIRCUMSTANTIAL	:manner	Expresses that the lack of occurrence of one event is a specific characterization of the other event. This is a subtype of ‘unexpected co-occurrence’ because typically, the more specific ‘characterizing’ event that did not happen is only expressed overtly if the general expectation is that it *would* happen.	*Sarah carried the bowl of punch into the living room **without** spilling a drop.*
BUT	(b / but-91)		

Conjunctive relations: subtypes of ‘and’

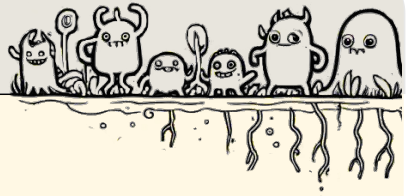
Meaning AND	Concept/Roleset	Definition	Example
CONSECUTIVE	(c / consecutive)	Expresses two or more events as a complex figure, with additional information on their temporal and/or logical sequencing.	
PURPOSE	:purpose	Expresses the intention on the part of the agent of one event towards bringing about another event.	*I grabbed a stick **in order to** defend myself.*
MEANS	:manner	Expresses a relation where one event accompanies another and characterizes more specifically what happened (or didn’t happen) in another event).	*He got into the army **by** lying about his age.*
CAUSE	:cause	Expresses a relation between a causing event and a resulting event, where the former explicitly brings about the latter.	*Sarah moved back to California **because** she couldn’t find a job in Washington.*
CONDITIONAL	:condition	Expresses a relation where one event is contingent upon the occurrence of another event.	***If** you touch it, it might explode.*
POSTERIOR/ ANTERIOR/ SIMULTANEOUS	:temporal	Expresses that one event takes place *before, after, or at the same time as* another. This can either be expressed through an adverbial construction with the earlier event in the main clause and the later event in a subordinate clause, or through iconicity of tense in coordinated clauses.	*I fed my dog **before** going to the office.*
ADDITIVE	(a / additive)	Expresses the addition of one ‘figure’ (foregrounded participant or event) to another one in order to form a complex figure.	
PURE ADDITION	:pure-addition	Expresses no temporal specification of the sequencing of events, but rather that the two events that form a complex figure cannot occur separately from each other in the context of the utterance.	***In addition to** having your hand stamped, **you have to** show your ticket to get into the concert.*
SUBSTITUTION	:substitution	Expresses that one of the events that together form a complex figure is offered as an ‘alternative’ or ‘replacement’ for the other-- this is typically expressed through the negation of one of the two coodinands.	***Instead of** going out to eat, we barbecued chicken at home.*

Conjunctive relations: subtypes of 'but'

Meaning	Concept/Roleset	Definition	Example
BUT PURE CONTRAST	(c / contrast-91)	Expresses two or more events as a complex figure, with additional information on their temporal and/or logical sequencing.	
		Expresses the intention on the part of the agent of one event towards bringing about another event.	*I grabbed a stick **in order to** defend myself.*
		Expresses a relation where one event accompanies another and characterizes more specifically what happened (or didn't happen) in another event).	*He got into the army **by** lying about his age.*
		Expresses a relation between a causing event and a resulting event, where the former explicitly brings about the latter.	*Sarah moved back to California **because** she couldn't find a job in Washington.*
		Expresses a relation where one event is contingent upon the occurrence of another event.	***If** you touch it, it might explode.*
		Expresses that one event takes place *before, after, or at the same time as* another. This can either be expressed through an adverbial construction with the earlier event in the main clause and the later event in a subordinate clause, or through iconicity of tense in coordinated clauses.	*I fed my dog **before** going to the office.*
		Expresses the addition of one 'figure' (foregrounded participant or event) to another one in order to form a complex figure.	
		Expresses no temporal specification of the sequencing of events, but rather that the two events that form a complex figure cannot occur separately from each other in the context of the utterance.	***In addition to** having your hand stamped, **you have to** show your ticket to get into the concert.*
		Expresses that one of the events that together form a complex figure is offered as an 'alternative' or 'replacement' for the other-- this is typically expressed through the negation of one of the two coodinands.	***Instead of** going out to eat, we barbecued chicken at home.*

DIALOGUE STRATEGIES

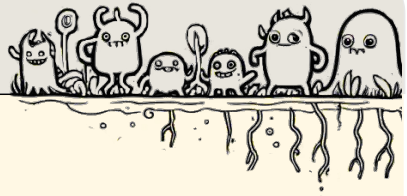
Special Dialogue Strategies: vocatives



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



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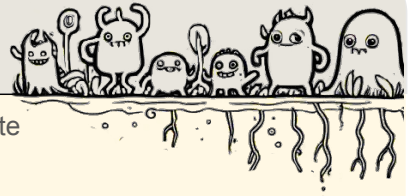
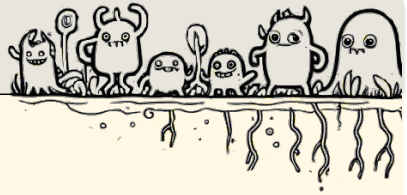
Special Dialogue Strategies: quotes



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
```

MULTIWORD EXPRESSIONS

UMR Annotation of MULTIWORD EXPRESSIONS

University of Colorado, Boulder

*Julia Bonn
Andrew Cowell
Alexis Palmer
Martha Palmer

Georgetown University

Shira Wien

Brandeis University

Haibo Sun
Jin Zhou
James Pustejovsky
Nianwen Xue

Charles University

Jan Hajič
Zdenka Urešová

Bonn, Julia, Andrew Cowell, Jan Hajic, Alexis Palmer, Martha Palmer, James Pustejovsky, Haibo Sun et al. "UMR Annotation of Multiword Expressions." In *Proceedings of the Fourth International Workshop on Designing Meaning Representations*, pp. 99-109. 2023.

2. A WRENCH IN THE GEARS of UMR Annotation:

UMR's Aim → uniform annotation across morphosyntactically-different languages

But → UMR based on AMR (AMR designed for English)

- Schema expects roughly 1:1 ratio between tokens & semantic concepts

ENGLISH:

'He ailed' vs. **'He got sick'** vs. **'He came down with** [X]**'**

TOKENS: 2 3 5

ARAPAHO:

'nih3iikoncebeit' lit. "*a ghost shot him with an arrow*"

TOKENS: 1 7

2. A TOUGH NUT TO CRACK for Annotators:

Challenge:

- Syntactic structure ≠ Semantic structure

Consequence ⟶ Annotators may not know

- what to include in a graph predicate
- which arguments to include
- How to handle modification of the MWE

'John kicked the bucket'

LITERAL:

(**k / kick-00**
  :actor (j / John)
  :undergoer (b / bucket))

FIGURATIVE:

(**k / kick-bucket-00**
  :undergoer (j / john)

3. The Goals IN A NUTSHELL:

Goal #1

Uniform annotation for semantically parallel sentences

Goal #2

Inter-annotator agreement for the same sentence

4. Multiword Expression Types: From Soup to Nuts

Less Figurative:

- Light Verb Constructions (LVCs)
  take a walk, do a dance, give a care
- Fixed MWEs
  by and large, all right
- Verb Particle Constructions (VPCs) & Verb Compounds
  clean up, pipe down
- Non-consecutive Constructions
  The [X]-er the [Y]-er
- Semi-fixed MWEs
  get [one]'s {hot little} hands on

4. Multiword Expression Types: From Soup to Nuts

More Figurative:

- Idioms

  get caught with [one]'s hand in the cookie jar

- Proverbs

  A watched pot never boils.

- 2-part Allegorical Sayings

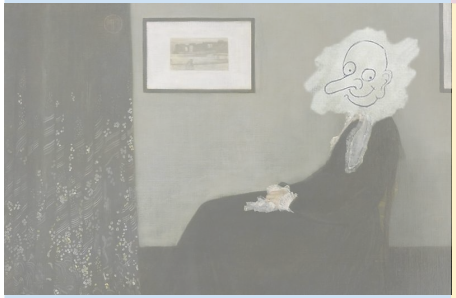
  Life is like a box of chocolates; you never know what you're going to get.

5. NUTS AND BOLTS: Fixed MWEs

Strategy:

Concatenate tokens

'One drawing goes along ***all right*** *and another has no resemblance to its subject.'*



```
(a / and
    :op1 (g / go-06
        :Arg1 (t / thing
            :quant 1
            :Arg1-of (d / draw-01))
        :Arg2 (a / along)
        :manner (a2 / all-right)
        :aspect activity
        :modal-strength full-affirmative)
    :o2p ...)
```

6. NUTS AND BOLTS: VPCs & Verb Compounds

Strategy: Concatenate tokens

'The little sheep ate the flower up.'

小 羊 把 花 吃 掉 了
little sheep BA flower {eat up} ASP

English Verb Particle Construction:

```
(e / eat-up-02
   :Arg0 (s / sheep
      :mod (l / little)
   :Arg1 (f / flower)
  :aspect performance
  :modal-strength full-affirmative)
```

eat-up-02: *eat completely*
Arg0-PAG eater
Arg1-PPT meal

Chinese Verb Compound:

```
(x5 / 吃掉-01                 'eat up'
   :Arg0 (x2 / 羊             'sheep'
      :mod (x1 / 小 ))        'little'
   :Arg1 (x4 / 花 )           'flower'
  :aspect performance
  :modal-strength full-affirmative)
```

吃 掉-01: *eat completely*
Arg0-PAG eater
Arg1-PPT meal

7. NUTS AND BOLTS: Light Verb Constructions

Strategy: 1. Drop verb 2. Roleset relates to nominal element

LEMMA ROLESET: (English)

'The children made a break for the playground.'

(b / break-20
  :Arg0 (c / child
    :refer-number Plural)
  :Arg2 (p / playground)
  :aspect performance
  :modal-strength full-affirmative)

break-20: *begin motion, suddenly*
Arg0-PAG actor
Arg1-SRC start location
Arg2-GOL destination

SYNONYMOUS ROLESET: (Spanish)

Le di miedo.
him I.gave fear
'I scared him.'

(a / asustar-01 'scare'
  :Arg0 (p / person 'I'
    :refer-person 1st
    :refer-number Singular)
  :Arg1 (p / person 'him'
    :refer-person 3rd
    :refer-number Singular)
  :aspect performance
  :modal-strength full-affirmative)

asustar-01: *scare*
Arg0-PAG actor
Arg1-PPT experiencer

COMPLEX NOMINAL ROLESET: (Czech)

Prošel zkouškou ohněm.
go.through exam by.fire
`He went through trial by fire.'

(z / zkouškou-ohněm-01 'undergo trial by fire'
  :Arg1 (p / person 'he'
    :ref-person 3rd
    :ref-number Singular)
  :aspect performance
  :modal-strength full-affirmative)

zkoušet-ohněm-01: *go through trial by fire*
Arg1-PAG undergoer
Arg2-TOP the trial

8. NUTS AND BOLTS: Schematic Constructions

Strategy:
Abstract UMR rolesets

THE [X]-ER, THE [Y]-ER:

'The closer the time comes, the happier I will be.'

时间 越 临近 , 我 就 越 感到 幸福
time more {get close} , I then more feel happy

```
(c / correlate-91
   :Arg1 (h / have-degree-91
      :ARG1 (c / come-01
         :ARG1 (t / time)
         :aspect activity
         :modal-strength full-affirmative)
      :ARG2 (m / more))
   :Arg2 (h2 / have-degree-91
      :ARG1 (h3 / happy-01
         :ARG1 (p / person
            :refer-person 1st
            :refer-number Singular)
         :aspect state
         :modal-strength full-affirmative)
      :Arg2 (m2 / more))
```

```
(c / correlate-91
   :Arg1 (h / have-degree-91
      :ARG1 (x1 / 临近-01                    'get close'
         :Arg0 (x2 / 时间)                   'time'
         :aspect activity
         :modal-strength full-affirmative)
      :ARG2 (x3 / 越))                       'more'
   :Arg2 (h2 / have-degree-91
      :ARG1 (x4 / 感到-01                    'feel'
         :Arg0 (p / person                   'I'
            :ref-person 1st
            :ref-number Singular)
         :Arg1 (x5 / 幸福)                   'happy'
         :aspect state
         :modal-strength full-affirmative)
      :Arg2 (x6 / 越))                       'more'
```

9. NUTS AND BOLTS: Idiom Rolesets

Strategy:

MWE Roleset:

- Arguments
- Token/slot syntactic description
- Metaphorical mapping

*'He **jumped on** the Bitcoin **bandwagon**.'*

(j / jump-on-bandwagon-09
  :Arg0 (p / person 'he'
    :refer-person 3rd
    :refer-number singular)
  :Arg1 (b / bitcoin)
  :aspect performance
  :modal-strength full-affirmative)

Jump-on-bandwagon-09
:ARG0 fad-participant
:ARG1 the fad

Definition: *join with others in participating in a fad*

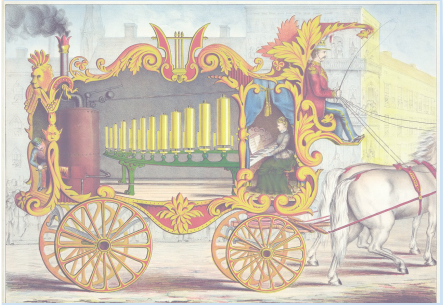
Syntactic Description:

TOKENS:	jump	on	the	bandwagon
SLOTS:	A	B	C	D
POS:	VB	PP	DET	NN
HEAD:	-	A	D	B

Metaphorical Mapping:

LITERAL:
(A / jump-03
  :Arg0 (n / N-ARG0)
  :destination (D / bandwagon))

FIGURATIVE:
(A / join-in-05
  :arg0 (n / N-ARG0)
  :arg1 (D / people
    :arg0-of (participate-01
    :arg1(f2/ fad
      :topic (n1 / N-ARG1))



Jump-03 *physically leap*
:ARG0 jumper

Join-in-05 *join a group*
:ARG0 joiner
:ARG1 group

participate-01 *take part in*
:ARG0 participant
:ARG1 activity

10. NUTS AND BOLTS: Proverbs

Strategy: new abstract roleset for proverbs

PROVERB-91

'The mountain is high and the emperor is far away.'
(When there's little global oversight, there's more local autonomy, and this is a good thing.)

```
(p / proverb-91
    :Arg1 (a / and
        :op1 (h / high-02
            :Arg1 (m / mountain)
            :aspect State
            :modstr FullAFF)
        :op2 (have-place-91
            :Arg1 (e / emperor)
            :Arg2 (a / away
                :extent (f / far))
            :aspect State
            :modstr FullAFF)))
```

山 高 皇帝 远
mountain high emperor {far away}

```
(p / proverb-91
    :Arg1 (a / and
        :op1 (x2 / 高-01                'high'
            :Arg0 (x1 / 山 )            'mountain'
            :aspect State
            :modstr FullAFF)
        :op2 (x4 / 远-01                'far away'
            :Arg0 (x3 / 皇帝)           'emperor'
            :aspect State
            :modstr FullAFF)))
```

10. NUTS AND BOLTS: Proverbs & 2-Part Allegorical Sayings

Chinese Xiehouyu (and similar)**:**

1. *antecedent* lays out a metaphor
2. *consequent* gives a focused interpretation for the metaphor

Strategy:
Proverb-91
Both roles

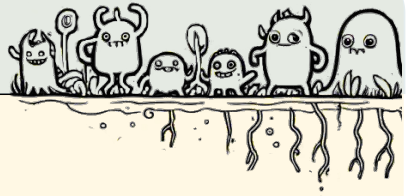
你 这 是 大炮 打 蚊子 -- 小题大做
you this be cannon shoot mosquito {solving small problem with big action}

'You are shooting cannon at mosquitoes -- making too much out of something small.'

```
(p / proverb-91
    :Arg1 (x5 / 打-02                          'shoot'
        :Arg0 (i / individual-person           'you'
            :ref-person 2nd
            :ref-number Singular)
        :Arg1 (x6 / 蚊子 )                      'mosquito'
        :instrument (x4 / 大炮 )                'cannon'
        :aspect Habitual
        :modstr FullAff)
    :Arg2 (x8 / 小题大做-01                     'make too much out of something small'
        :aspect Habitual
        :modstr FullAff))
```

LAST THINGS

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