

UMR schema lists and cheat sheets

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UMR Summer School

UMR GUIDELINES: <https://github.com/umr4nlp/umr-guidelines/blob/master/guidelines.md>

UMR WRITER: <https://umr-tool.cs.brandeis.edu>

Graph *forms*

UMR *concept* graph forms: graph constituents that serve as graph nodes

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

UMR *relation* graph forms: graph constituents that serve as graph edges

- **All relations:** :actor, :ARG0
 - Starts with colon
- **Inverse relations:** :actor-of, :ARG0-of
 - Have -of suffix
 - If (A :role B) → (B :role-of A)

Special note: Reified roles: have-actor-91 (doesn't apply to numbered args)

- Each general relation can be reified by a roleset in the form 'have-<role>-91', with :ARG1 as the entity/event having that role, and :ARG2 as the role value (additional args may apply for some roles)

UMR Concept Types

Language-specific concepts/rolesets: derived from tokens in the sentence

- **Language-specific basic concepts:**
 - **Use lemma form** (unless your annotation is early stage 0 and you haven't figured out what your lemma forms will look like yet)
- **Language specific predicates:**
 - **Use roleset ID format**, which could be either of the following:
 - **Lemma form** (unless your annotation is early stage 0 and you haven't figured out what your lemma forms will look like yet)
 - **Plus an -00 suffix** if you haven't created full rolesets yet
 - **Or, full roleset label with sense number suffix** (e.g. *choose-03*, *put-down-02*)

Abstract UMR elements: supplied as part of UMR, used across languages for concepts that are implicit or cross-linguistically generalizable

- **Abstract basic concepts:**
 - **Named Entity types** (p / person), (h / human-settlement), (m / mountain-range)
 - **Quantity/entity types** (t / temporal-quantity), (u / url-entity)
 - **General implicit concepts:** (a / and), (e / exclusive-disjunction), (u / umr-unknown)
 - for conjunction, question marking, etc.
- **Abstract (-91) rolesets:**
 - **Abstract role-reifying rolesets:** (h / have-duration-91) → for :duration
 - (see previous slide)
 - **Abstract nonprototypical predication rolesets:** (h / have-rel-role-91)
 - For predication of **possession**, **location**, **objects**, **properties**, and **identity**
 - **Abstract discourse relation rolesets:** (b / but-91)
 - For inter-clausal relations
 - **Other abstract rolesets:** (r / resemble-91), (p / publication-91)
 - Rolesets for general implicit frameworks and constructions that need a fixed argument structure

UMR Relations: 3 types

General Semantic Roles: UMR has 3 types of general semantic roles

- **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

Sub-roles:

- Special roles projected by certain abstract concepts like (d / date-entity). Includes things like :value, :unit, :scale, :op1-N, :name, :range, :weekday, etc.
- Not used elsewhere in the graphs-- only available under the concepts that specify them

Modal Relations: special category, automatic conversion to doc-level graph annotations

- **:modal-strength** epistemic strength relation (degree of confidence/certainty) between a conceiver and an event or between a conceiver and an embedded conceiver
- **:modal-predicate** relation between a modal complement-taking predicate and its complement
- **:quote:** relation between a speech predicate and its complement

Participant Roles:

:actor
:undergoer
:theme
:experiencer
:stimulus
:force
:causer
:cause
:reason
:purpose
:companion
:affectee
:recipient
:instrument
:manner
:place
:source
:start
:goal
:temporal
:part
:group
:material
:extent
:other-role

Nonparticipant Roles:

:direction
:path
:duration
:frequency
:poss
:topic
:medium
:age
:example
:ord
:list-item
:mod
:vocative

:pure-addition
:apprehensive
:substitute
:subtract
:condition
:concessive-condition
:concession

Modal Roles:

:modal-strength
:modal-predicate
:quote

Attribute Roles:

:polarity
:quant
:mode
:degree
:aspect
:refer-person
:refer-number

Sub-Roles:

NAMED-ENTITIES:

:name
:wiki

QUANTITIES/ETC:

:unit
:scale
:value
:range

DATE-ENTITY:

:day
:month
:year
:weekday
:time
:timezone
:quarter
:dayperiod
:season
:year2
:decade
:century
:calendar
:era

NUMBERED:

:opX
:sntX

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)
: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

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**

He gave the cake to **the dog**

She hit him with **a broom**

She exercised 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**

NONPARTICIPANT ROLES

:direction
:path
:duration
:frequency
:possessor
:topic
:medium
:age
:example
:part
:group
:ord
:list-item
:mod
:vocative

Direction of motion, literal or fictive
Path of motion, literal or fictive
How long an event persists
How often an event occurs
The entity who owns/controls another entity
The subject matter of an entity/event
Medium through which an event occurs
Age of an entity
Exemplars of a set of entities/events
A constituent part of an entity/event
A set of entities/events
For count/rank
For list numbering
Catch-all role for modifiers that don't fall into other roles
For cases where an entity is addressed by name

He walked **towards home**
He walked **in a circle**
He walked **for 10 minutes**
He walked **every morning**
She found **her hammer**
The talked about **the weather**
She called him **on the phone**
He felt 200 years old
He packed some snacks like **cheese and fruit**
Her hand felt cold
A flock of birds
I climbed to the **2nd** floor
b) other
That girl
He ate some cake **too**
I don't know, **Todd**-- why is the carpet wet?

DISCOURSE RELATION ROLES

:pure-addition
:apprehensive
:substitute
:subtract
:condition
:concessive-condition
:concession

When two events form a complex figure whose ordering is not specified
Two events are mutually exclusive alternatives. Carrying out one precludes the other
One event is a replacement for another
One event is characterized by the absence of another
One event is contingent upon another
One event will be true under the range of conditions given
Speaker believes both events will occur, but co-occurrence is unexpected

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

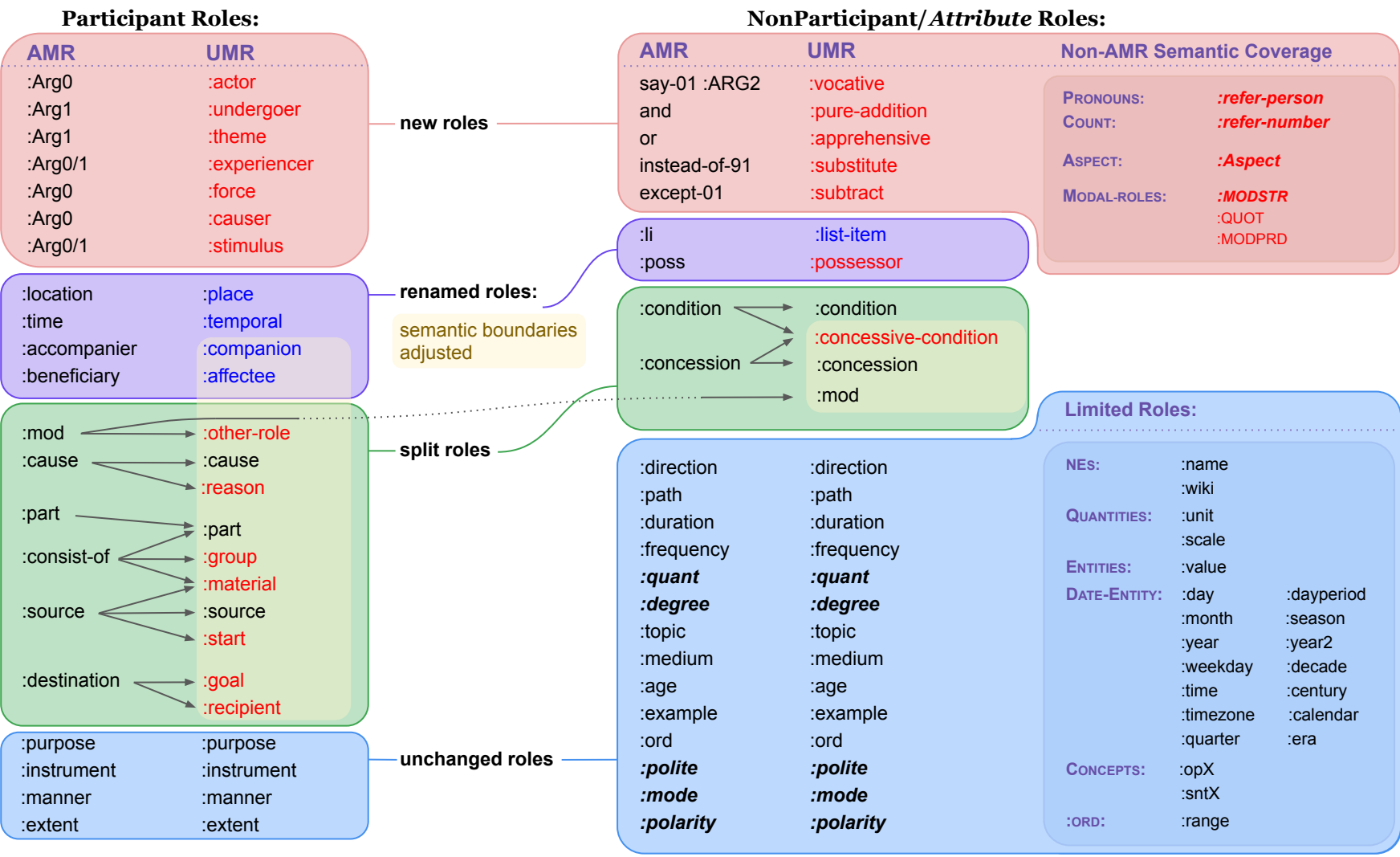
ATTRIBUTE ROLES (take constant values)

: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, downtoner
: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 ROLES (take constant values or variable reentrancies)

: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 predicate>

Role-Role Mappings from AMR



Participant Role Reifications:

:actor	have-actor-91
:undergoer	have-undergoer-91
:theme	have-theme-91
:experiencer	have-experiencer-91
:stimulus	have-stimulus-91
:force	have-force-91
:causer	have-causer-91
:cause	have-cause-91
:reason	have-reason-91
:purpose	have-purpose-91
:companion	have-companion-91
:affectee	have-affectee-91
:recipient	have-recipient-91
:instrument	have-instrument-91
:manner	have-manner-91
:place	have-place-91, exist-91
:source	have-source-91
:start	have-start-91
:goal	have-goal-91
:temporal	have-temporal-91
:part	have-part-91
:group	have-group-91
:material	have-material-91
:extent	have-extent-91
:other-role	have-other-role-91

Nonparticipant Role Reifications:

:direction	have-direction-91
:path	have-path-91
:duration	have-duration-91
:frequency	have-frequency-91
:poss	have-91, belong-91
:topic	have-topic-91
:medium	have-medium-91
:age	have-age-91
:example	have-example-91
:ord	have-ord-91
:list-item	have-list-item-91
:mod	have-mod-91
:vocative	have-vocative-91

Attribute Role Reifications:

:polarity	have-polarity-91
:quant	have-quant-91
:mode	have-mode-91
:degree	have-degree-91 have-degree-92

Sub-Role Reifications:

:name	have-name-91
:unit	have-unit-91
:value	have-value-91
:range	have-ord-91

Non-Prototypical Predication:

		THETIC/PRESENTATIONAL	PREDICATIVE
POSSESSION	:poss	have-91	belong-91
LOCATION	:place	exist-91	have-place-91
PROPERTY	:mod	have-mod-91	
EQUATIONAL		identity-91	
OBJECT		have-role-91	
		have-rel-role-92	
		have-org-role-92	

THETIC/PRESENTATIONAL: either all of the information is 'new', or only the possessor/entity-in-situ is.
PREDICATIVE: the possession/place is new info

Discourse Relation Reifications

:pure-addition	have-pure-addition-91
:apprehensive	have-apprehensive-91
:substitute	have-substitution-91
:subtract	have-subtraction-91
:condition	have-condition-91
:concessive-condition	have-concessive-condition-91
:concession	have-concession-91
	unexpected-co-occurrence-91
	but-91
	contrast-91

UMR Abstract Rolesets: implicit rolesets

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 courses (incl. the <X>-101' construction)

- :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

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

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

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

rate-entity-91 for '3 times a week in the eventing' 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

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

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...)

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

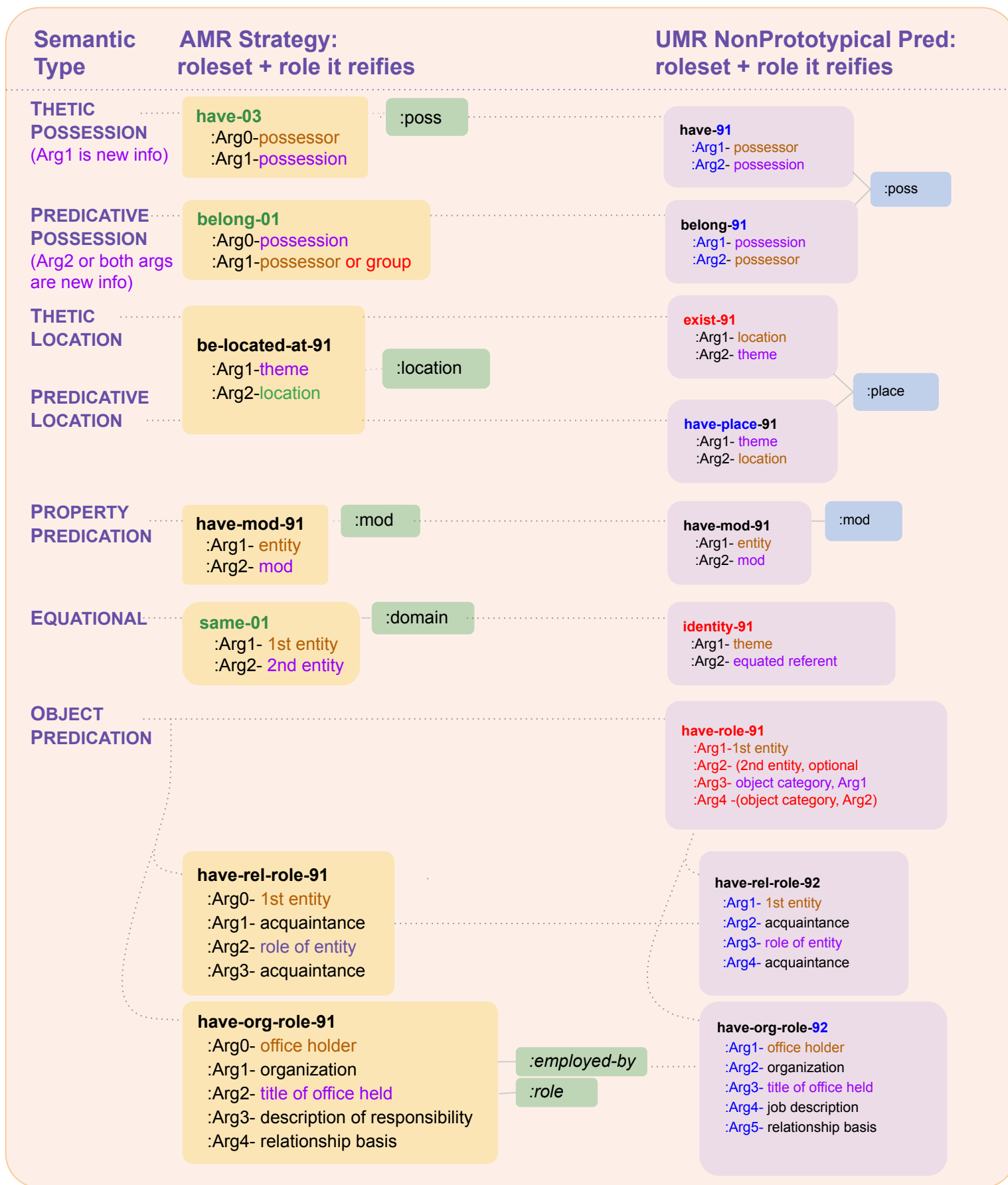
emit-sound-91 for transcription of noises, noise imitations

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

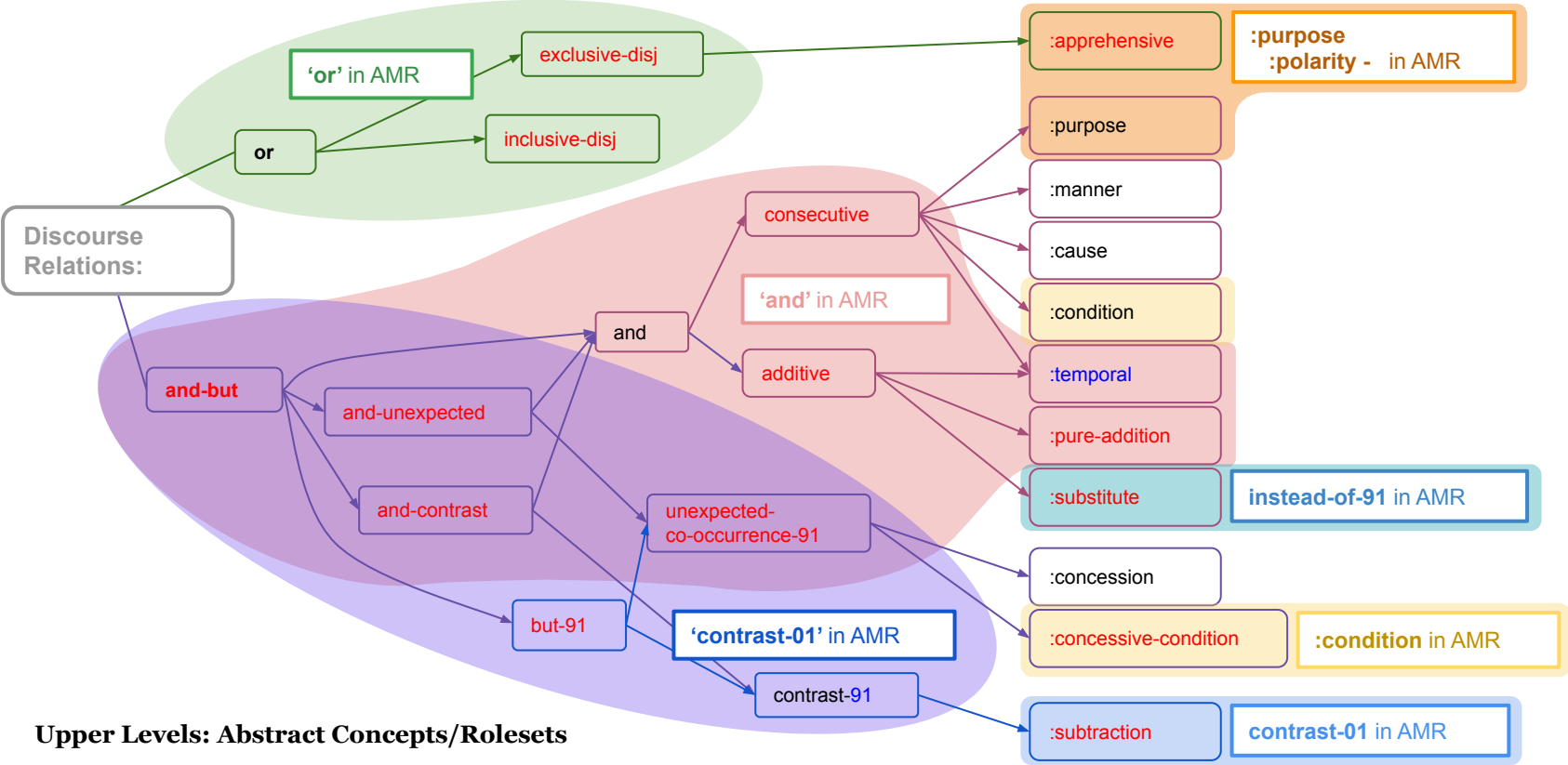
proverb-91 for proverbs and 2-part allegories

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

Rolesets for NonPrototypical Predication:



UMR DISCOURSE RELATIONS LATTICE



Upper Levels: Abstract Concepts/Rolesets

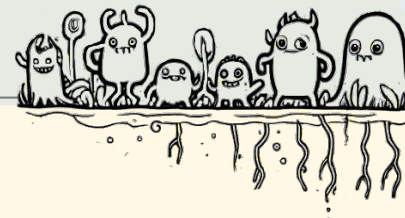
Meaning	Concept/Roleset	Roles
DISJUNCTIVE	or	:op1 :op2 :opX
EXCLUSIVE DISJUNCTIVE	exclusive-disj	:op1 :op2 :opX
INCLUSIVE DISJUNCTIVE	inclusive-dis	:op1 :op2 :opX

AND	and	:op1 :op2 :opX
CONSECUTIVE	consecutive	:op1 :op2 :opX
ADDITIVE	additive	:op1 :op2 :opX
AND + BUT	and-but	:op1 :op2 opX
AND + UNEXPECTED	and-unexpected	:op1 :op2 :opX
AND + CONTRAST	and-contrast	:op1 :op2 :opX
UNEXPECTED CO-OCCURRENCE	unexpected-co-occurrence-91	:ARG1 :ARG2
BUT	but-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	have-substitute-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

Abstract Concepts



person

umr-unknown

umr-choice

truth-value

name

sum-of

Product-of

more-than

less-than

and

consecutive

or

exclusive-disj

inclusive-disj

ordinal-entity

string-entity

percentage-entity

ordinal-entity

string-entity

percentage-entity

score-entity

url-entity

date-entity (+ its roles:)

:calendar

:century

:day

:dayperiod

:decade

:era

:month

:quarter

:season

:timezone

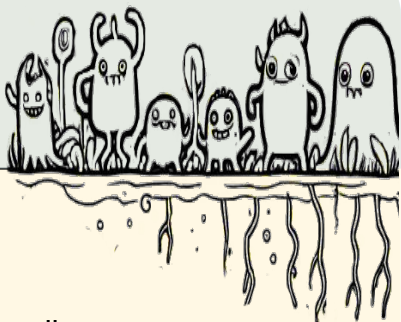

:weekday

:year

:year2

:time

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 (μM), 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, fahrenheit
angle-quantity	:unit degree, radian

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 are sharp
Processes	I said [<i>that</i> the thorns <i>scratched</i> me] The [<i>scratching</i> of the thorns]	The thorns <i>that</i> [<i>scratched</i> me]/ 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

Semantic
types

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

2. **Applying event attributes at sentence level:**

- a. **:aspect**
- b. **:modal-strength**

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

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

- a. **:temporal dependency**

But *only* UMR events get these annotations

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

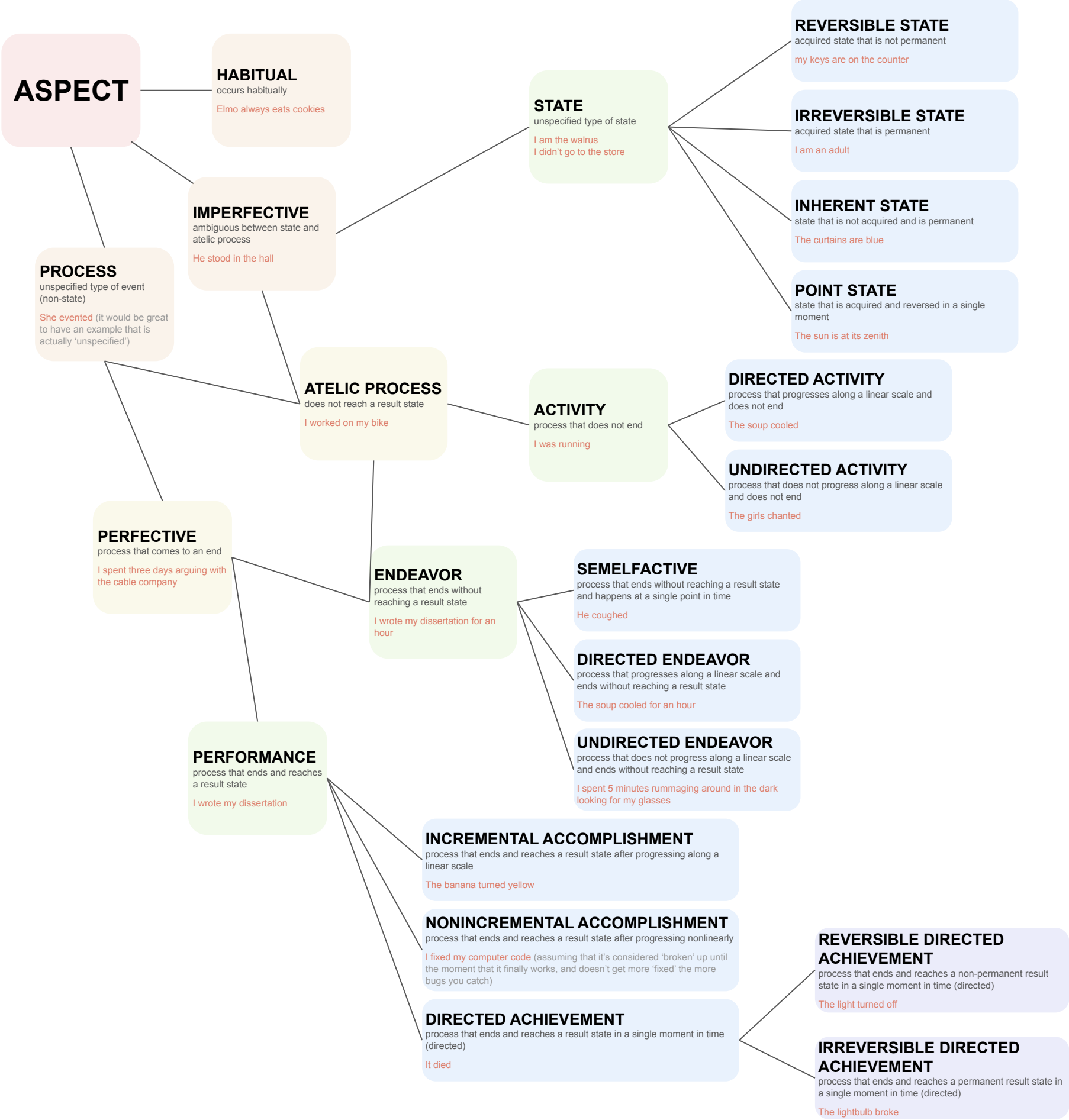
- Some kind of ongoing event, beginning/endedness uncertain or unspecified
- Events expressed as nouns default to this

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.



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

UMR & Polysynthesis:

comparing a sentence in Arapaho vs English, in AMR vs UMR

ARAPAHO SENTENCE:

Text:

beni'beebee3sohowuuneti3i' .

Morphological breakdown:

beni'- bee- bee3sohowuuneti -3i'

English glosses:

IC.just- REDUP- do sign language to each other -3PL

Parts of speech:

prefix- prefix- vai.RECIP -infl

English Translation:

[They didn't speak.] They were just doing sign language back and forth."

	Arapaho:	English translation:
AMR:	(b / beni'beebee3sohowuuneti3i'-00)	(s / sign-00 :actor (t / they) :recipient t :mod (j / just) :manner (b / back-and-forth))
UMR:	(b / beebee3sohowuuneti-00 :actor (p / person **/-3i'/ :refer-person 3rd :refer-number Plural) :recipient p :ARG1-of (c / contrast-91) **/beni'-/ :Aspect Activity **/bee-/ :modstr FullAff)	(s / sign-00 :actor (p / person **they :refer-person 3rd :refer-number Plural) :recipient p **back and forth :ARG1-of (c / contrast-91) **just :Aspect Activity **back and forth :modstr FullAff)