Subcategorizing Adverbials in Universal Conceptual Cognitive Annotation

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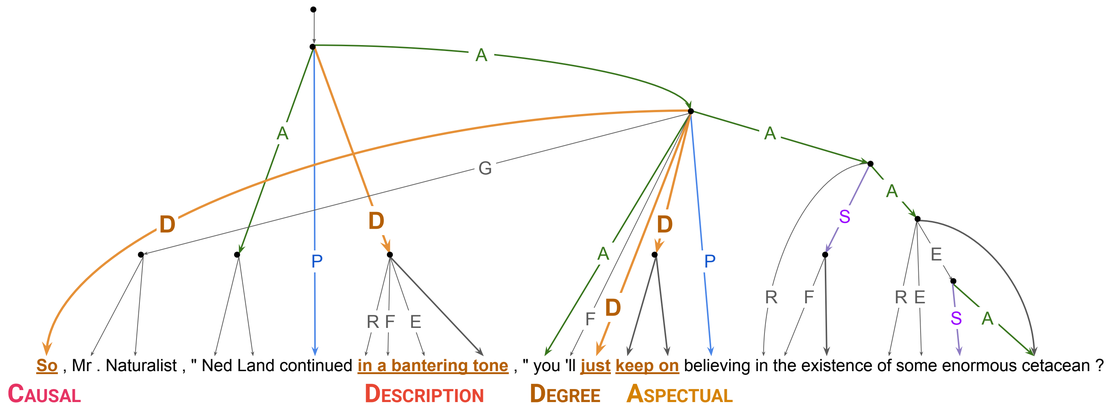
Introduction

- UCCA (Abend & Rappoport, 2013): Coarse multilayer predicate-argument graph structure
  - **Scene** structure: Certain words *evoke* **Process** or **State** units
  - Other words and phrases denote event participants, modifiers, and relations
  - Cross-linguistically applicable; grounded in Basic Linguistic Theory (Dixon, 2010)
  - Annotated over tokenized text for a diverse set of languages
- Scene-level modifiers are called **Adverbials**
  - Semantically and syntactically extremely **heterogeneous**
  - **Difficult** to annotate and maintain as a single category
  - Questionable how **useful** such a coarse grouping is for downstream applications

Analyzing Adverbials in UCCA

Foundational layer categories: State, Process, pArticipant, aDverbial, Elaborator, Relator, Function, Ground, ...



➔ We propose to **refine** UCCA Adverbials with 7 subcategories.

➔ **Multiple categories** may be assigned whenever a complex Adverbial unit signals different semantic nuances at once.

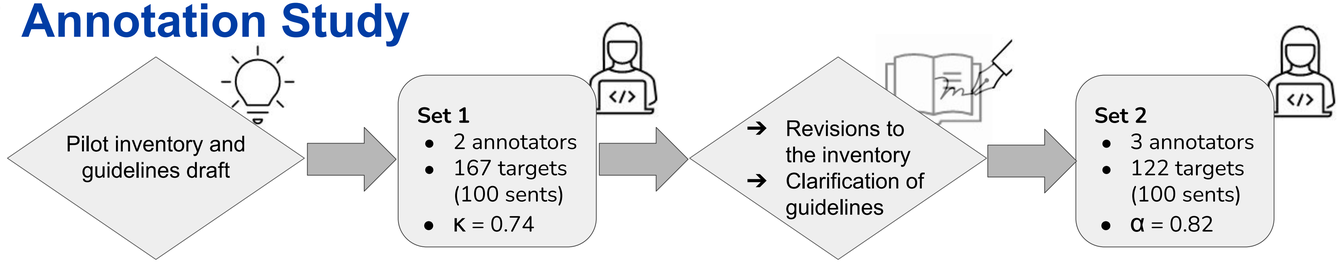
Examples

1. I [**would D-Possibility**] [**n't D-Negation**] [go P] there [**again D-Aspectual**].
2. He [**postponed D-Aspectual**] our [meeting P] until next Monday.
3. [**Had it not been for D-Causal**] [the shouts of crewmen P]...
4. I can [do P] [**no better D-Comparison+Description+Negation**] than to compare him with it.
5. The ability to see in the dark [increased P] their chances [**by fifty percent D-Degree**].
6. Now it was [**no longer D-Negation+Aspectual]** [an issue of a scientific problem S] to solve.

Refinement Inventory

Category	Description	Examples
Aspectual	Start-/end-points of a state or process, duration or repetition, whether it is temporary or habitual, and event quantification	later, still, constantly, begin, stop, keep
Causal	Secondary predications of causation, reason, and condition	let, make (sb. do sth.)
Comparison	Marks the presence of (lexical or morphological) comparative or superlative markers at the scene level, either within a larger Adverbial or in isolation	more, most, less, -er
Degree	Non-comparative degree or extent of a process or state	extremely, colossal
Description	Adding or highlighting contentful properties (manner, circumstance, etc.) of a process or state	fast, feverishly, busy
Negation	Explicit lexical or morphological negation	not, without, no longer
Possibility	Includes formal semantic modality as well as broadly markers of non-factuality and subjectivity	want, must, actually

Annotation Study



Category	Set 1 κ	Set 1 F1-score	Set 2 α
Description	0.76	0.85	0.70
Negation	0.97	0.97	1.00
Possibility	0.78	0.82	0.87
Degree	0.81	0.83	0.79
Aspectual	0.85	0.88	0.84
Comparison	0.66	0.67	0.95
Causal	0.32	0.33	0.57
N/A	0.00	0.00	0.26
Avg. with N/A	0.64	0.84	0.74
Avg. without N/A	0.74	0.84	0.82

Table 4: Inter-annotator agreement results for Sets 1 & 2. Since Cohen's κ does not support multi-label input, we provide average across the categories for it (macro-average) whereas for F1 score we provide micro-average across the instances rather than the categories. For Krippendorff's α we provide macro-average.

Category	Annotator 1 Set 1	Annotator 1 Set 2	Annotator 2 Set 1	Annotator 2 Set 2	Ann. 3 Set 2
Description	66	32	54	25	19
Negation	15	19	15	19	19
Possibility	26	17	22	18	17
Degree	20	24	25	25	23
Aspectual	27	18	29	20	21
Comparison	1	2	2	4	3
Causal	2	1	10	4	5
Comp.+Desc.	5	3	1	3	2
Neg.+Asp.	4	–	4	–	–
Desc.+Deg.	1	3	2	1	–
Poss.+Neg.	–	–	1	–	–
Comp.+Deg.	–	2	–	–	1
Asp.+Caus.	–	–	–	1	1
N/A	–	1	2	2	11
Total	167	122	167	122	122

Table 3: Subcategory counts for annotation sets 1 & 2. Annotator 3 did not participate in Set 1 annotation. N/A refers to a judgment that the unit should not have been considered an Adverbial in the foundational layer.

Observations

- Overlap exists between our Adverbial refinement layer (Aspectual, Possibility) and UCCA's foundational layer (Time, Ground).
  - John will [come P] [**regularly T**].
  - John will [come P] [**for the second time D-Aspectual**].
- Some overlap with existing MR schemes, such as non-core roles in AMR, as well as prepositional labels in SNACS.

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