Different Tastes of Entities: Investigating Human Label Variation in Named Entity Annotations

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Named Entity (NE) annotations differ between versions. Are they:

Annotation Errors?

Guideline Differences?

Text Ambiguity?

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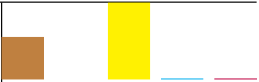
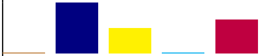
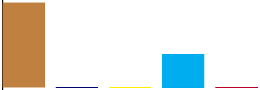
	Sentence	PER LOC ORG MISC O
a.	UK bookmakers [William Hill] said on Friday they ... *original, conllpp, reiss: PER clean: ORG*	
b.	[ALPINE] SKIING – WOMEN 'S WORLD CUP ... *original, conllpp, reiss: O clean: LOC*	
c.	I bear witness that there is no [God] . *original, conllpp, reiss: PER clean: MISC*	

Table 1: CoNLL 2003 Named Entity annotations (`original`), subsequent revisions (`conllpp`, `reiss`, `clean`), and distributions of student annotations.

This work

- Human Label Variation (HLV) are linguistically debatable cases where multiple labels are acceptable (Plank, 2022);
- We study HLV in *expert-annotated NE data* in 3 language(s) variants: *English, Danish, Bavarian*;
- HLV among *iterative published revisions* vs. *independent annotators*.

Datasets & Preprocessing

English:

- `original`: Tjong Kim Sang and De Meulder (2003);
- `conllpp`: Wang et al. (2019)'s revision;
- `reiss`: Reiss et al. (2020)'s revision;
- `clean`: Rücker and Akbik (2023)'s revision.

Danish:

- `plank`: Plank et al. (2020)'s original;
- `hvingelby`: Hvingelby et al. (2020)'s revision.

Bavarian: disagreements between two annotators on the double-annotated subset of BarNER (Peng et al., 2024).

Preprocessing: token alignment and tagset normalization.

Entity-level Disagreements

Four disagreement types – adapted Reiss et al. (2020)'s error types:

- `Tag`: same span but different tags

  [a b]$_{LOC}$ vs. *[a b]*$_{ORG}$

- `Span`: different overlapping spans but same tag,

  [a b]$_{LOC}$ vs. *[a]*$_{LOC}$ *b*

- `Both`: overlapping spans with different tags,

  [a b]$_{LOC}$ vs. *[a]*$_{ORG}$ *b*

- `Missing`: one annotator misses the entity completely

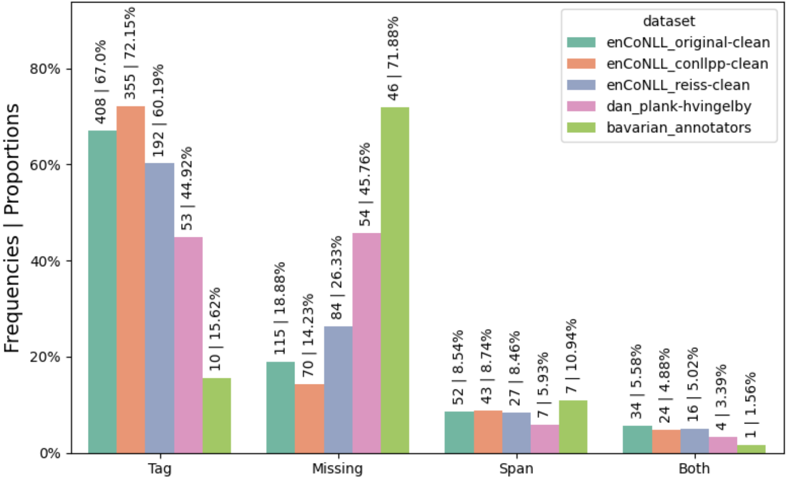
  [a b]$_{LOC}$ vs. *a b*

Five comparison pairs:

- EN `original-clean`, `conllpp-clean`, `reiss-clean`;
- DA `plank-hvingelby`;
- BAR annotators.

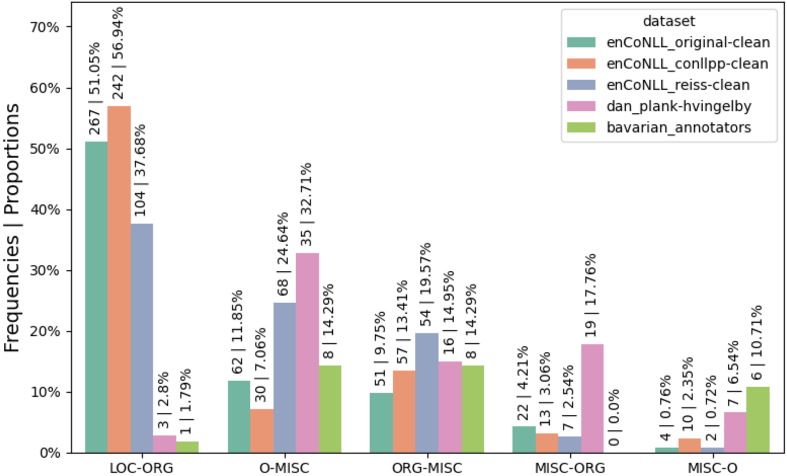
Tag and Missing disagreements are prevalent

- Tag contributes most to English revisions;
- Danish and Bavarian contain more Missing;
- Tag+Missing accounts for 85%+ disagreements in all comparisons.



Top disagreed label pairs in Tag+Missing

- LOC-ORG, O-MISC, ORG-MISC most frequent (70%+) in English;
- Most (80%+) of Danish concern MISC, e.g., ships & clubs;
- Missing (O) annotations donate the majority (70%+) to Bavarian.



Sources of Disagreements

Three sources – adapted Jiang and de Marneffe (2022) – to understand which factors triggered these disagreements:

- *Text ambiguity*: uncertainty in sentence meaning with or without sufficient context;
- *Guideline update*: NE type definitions vary across guideline versions;
- *Annotator error*: attention slip or knowledge gap errors.

Case study

- Manually annotated a small sample of disagreed NE pairs;
- EN: 200 `original-clean` test; all in DA (118) & BAR (64) test;
- IAA (Kappa) on 50 `original-clean` NEs: 61.73%.

Sources of Disagreements – Observations

- Difficult: lack of information as *annotator error* or *text ambiguity*;
- EN: most (80.0%) are *guideline update*: `clean` is more context-free;
- DA: 52.5% *guideline updates*, LOC/MISC; 41.5% *annotator errors*;
- BAR: 67.2% *annotator error*; but acceptable by some EN guidelines.

Source types	English		Danish		Bavarian	
text ambiguity	19	9.5%	7	6.0%	10	15.6%
guideline update	160	80.0%	62	52.5%	11	17.2%
annotator error	21	10.5%	49	41.5%	43	67.2%
Total	200	100.0%	118	100.0%	64	100.0%

Table 2: Distributions of sources of disagreements.

Classroom Surveyed Annotations

Label variation surfaces in classroom-surveyed annotations.

Sentence	PER	LOC	ORG	MISC	O	*abstained*
LA CLIPPERS AT [NEW YORK]		14 original conllpp reiss	0 clean			
[White House] spokesman Mike McCurry said ...		2 original conllpp reiss	11 clean	1		
The man who kicked [Australia] to defeat with ...		5 original conllpp reiss	9 clean			
The granddaughter of Italy 's [Fascist] dictator			3	3 clean	8 original conllpp reiss	
at about 1:30 A.M. [EST]				10 clean	2 original conllpp reiss	2

Table 3: Classroom surveyed annotations on difficult disagreement cases in CoNLL03 test.

Conclusion & Future Work

Conclusion

- *NE disagreements* across *expert revisions* vs. *individual annotations*;
- *Guideline updates* and *text ambiguities* lead established EN+DA;
- *Annotator errors* dominate the new BAR corpus;
- *Student-surveyed annotations* help distributional analyses.

Ongoing & Future Work

- More statistically meaningful (larger) student-surveyed annotations;
- Separating valid label variations from true errors (Weber-Genzel et al., 2024);
- More dialectal datasets (Blaschke et al., 2024; Peng et al., 2024);
- Inform models regarding conflicts among annotation guidelines.

Questions?
Comments?

Paper

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