Post-editing with different MT models

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Background

Finnish and MT

- Rich morphology, productive compound words and relatively free word order cause problems; word form errors common.

(see Koskenniemi et al. 2012; Tiedemann, Ginter & Kanerva 2015; Pirinen, Toral & Rubino 2016)

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Comparisons of different MT models

- NMT (en-fi) produces fewer errors in word forms and word order than SMT, similar number of lexical errors.
- NMT produces more omissions.

(see Toral & Sánchez-Cartagena 2017; Castilho et al. 2017)

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The effect of MT errors

- PE: Number of errors and *type* of error may affect PE effort.
- Gisting: Recovering missing information particularly difficult.

(see e.g. Koponen 2016; Koponen & Salmi 2015; Krings 2001)

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PE effort in Finnish: a pilot study

Data

- PE experiment with translator students in HY (2016): 16 participants, all native speakers of Finnish.
- 1 source text (27 sentences, 385 words); from WMT 2016 dataset.
- 3 MT versions statistical (UH Opus), neural (Abumatran), rule-based (Sunda).
- For PE, MT versions were mixed so that each participant edited 9 sentences from each system.
- Process data: keylogging (Translog-II) and eyetracking (SMI RED-m) + retrospective think-aloud using replay.
- Manual analysis of edits, supported by TERp and OMorFi/FinnPos.

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Overview of PE data by participant

Editor	Version	Words	Unedited	Edited	HTER	PE time
P03	1	348	203	145	0.42	23:19
P05	1	341	172	169	0.50	20:07
P06	1	347	202	145	0.42	13:34
P08	1	341	210	131	0.38	15:43
P09	1	338	249	89	0.26	17:42
P12	2	342	232	110	0.32	20:28
P14	2	345	238	107	0.31	17:58
P16	2	361	193	168	0.47	19:45
P11	3	381	153	228	0.60	36:36
P13	3	351	191	160	0.46	26:44
P15	3	356	172	184	0.52	20:39

Different types of MT errors by system

mt	unedited	form	+order	word	+order	extra	missing	order
nmt	678	137	18	146	8	79	110	36
rbmt	771	167	21	110	8	216	63	51
smt	766	139	29	85	8	37	159	9

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Problem: What is an error, anyway?

Defining an error based on PE

"any feature of the translation which causes the posteditor to put pen to paper"

(Green 1982: 101)

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An analysis of correctness and necessity of PE corrections

Editor	Words	Unedited	Edited	corr +nec	corr+ unnec	incorr edit	incorr uned
A	348	203	145	85	50	10	4
B	341	172	169	69	76	24	2
C	347	202	145	90	51	4	0
D	341	210	131	76	45	10	9
E	338	249	89	57	21	11	20

Koponen & Salmi (2017)

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Investigating the correctness and necessity of edits

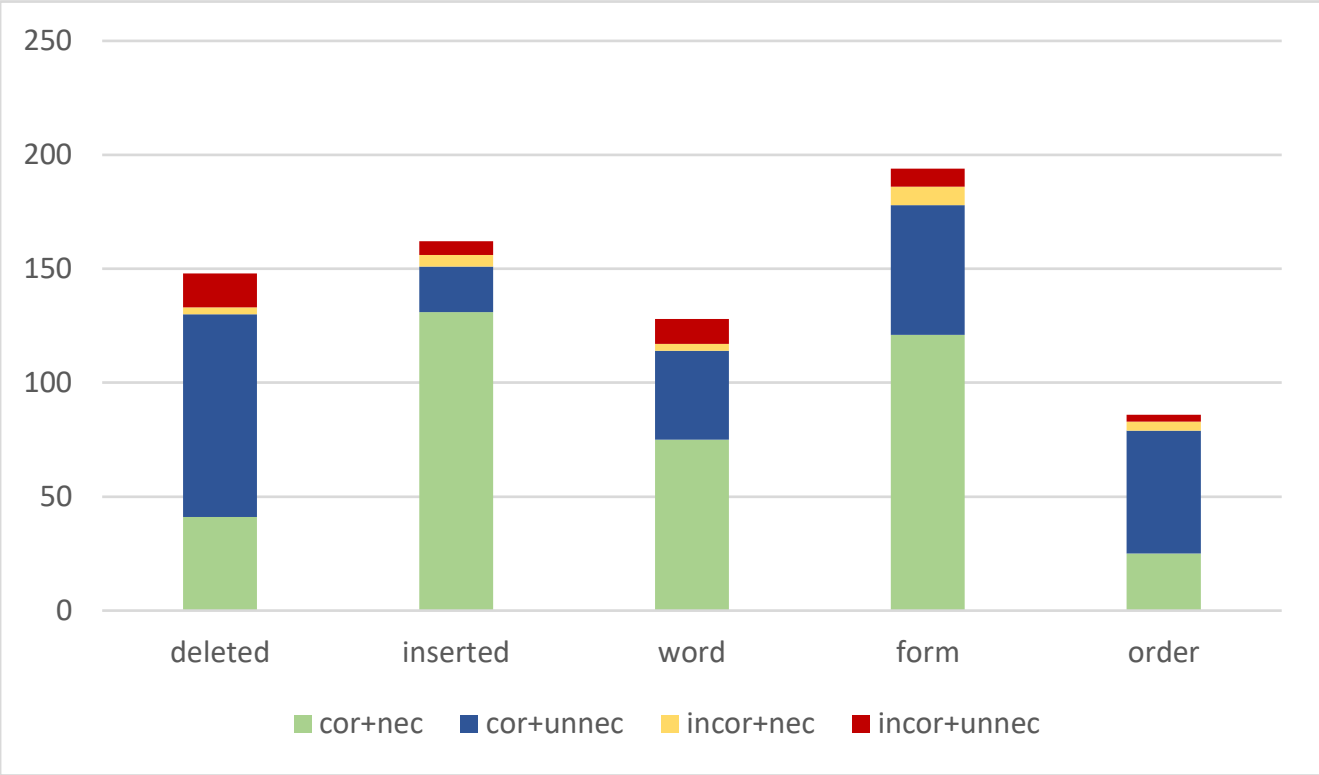

Figure: Correctness and necessity by type of edit

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Do the editors agree what needs to be changed?

Example

ST We will publish your name as you provide it (unless you ask us not to)

MT Julkaisemme nimenne niin kuin annatte sen (**paitsi jos pyydätte meitä olemaan**)

MT	paitsi jos		pyydätte	meitä olemaan		
A	paitsi jos		pyydätte	ettemme	käytä	sitä
B	paitsi jos	erikseen	kiellät			sen
C	paitsi jos		pyydät	meitä olemaan	julkaisematta	
D	paitsi jos		kiellätte			sen
E	paitsi jos		pyydätte	meitä	käyttämättä	

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Observations from the analysis so far

- NMT sentences contained the largest number of edits overall and the largest number of lexical changes.
- RBMT sentences contained the largest number of extra words, word form and word order edits, but the smallest number of missing words.
- SMT sentences contained the largest number of missing words, but smallest number lexical changes, extra words and word order changes.

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- The definition of "error" by relying on PE corrections is problematic.
- The definition of "error" or "edit" on word-level is problematic.
- Ongoing and future work
  - More detailed comparisons of PE versions to reveal systematic patterns of edits.
  - Analysis of process data (keylogging, pauses, eyetracking) for effort indicators.

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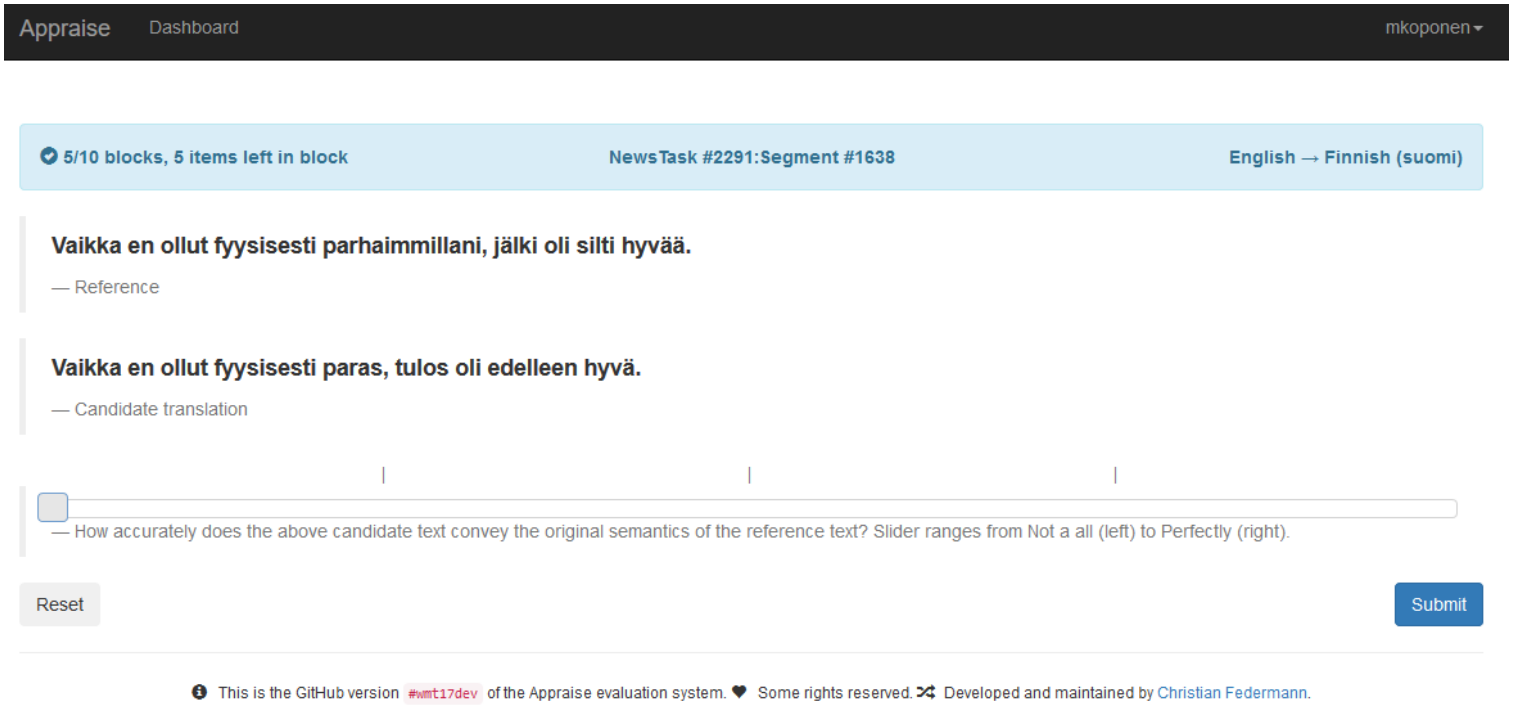
Thank you! Questions? Comments?



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References

- S. Castilho, J. Moorkens, F. Gaspari, I. Calixto, J. Tinsley & A. Way. 2017. Is Neural Machine Translation the New State of the Art? *Prague Bulletin of Mathematical Linguistics* No. 108, 109–120.
- R. Green. 1982. The MT errors which cause most trouble to posteditors. V. Lawson, ed. *Practical experience of machine translation. Proceedings of a conference, London, 5-6 November 1981*, 101–104. North Holland Publishing Company, Amsterdam.
- M. Koponen. 2016. *Machine Translation Post-editing and Effort: Empirical Studies on the Post-editing Process*. Doctoral dissertation, University of Helsinki.
- M. Koponen & L. Salmi. 2015. On the correctness of machine translation: A machine translation post-editing task. *Journal of Specialised Translation*, 23: 118-136.
- M. Koponen & L. Salmi. 2017. Post-editing quality: Analyzing the correctness and necessity of post-editor corrections. *Linguistica Antverpiensia, New Series: Themes in Translation Studies* (to appear in November 2017).
- K. Koskenniemi et al. 2012. *Suomen kieli digitaalisella aikakaudella – The Finnish Language in the Digital Age*. G Rehm & H Uszkoreit (series editors). *META-NET White Paper Series*. Springer.
- HP. Krings. 2001. *Repairing texts: Empirical investigations of machine translation post-editing process*. GS Koby (ed./trans.). The Kent State University Press, Kent, OH.
- T. Pirinen, A. Toral & R. Rubino. 2016. Rule-Based and Statistical Morph Segments in English-Finnish SMT. *Proceedings from IWCLUL: Second International Workshop on Computational Linguistics for Uralic Languages*.
- J. Tiedemann, F. Ginter & J. Kanerva. 2015. Morphological Segmentation and OPUS for Finnish-English Machine Translation. *Proceedings from WMT10: The Tenth Workshop on Statistical Machine Translation*, 177-183.
- A. Toral & VM. Sánchez-Cartagena. 2017. A Multifaceted Evaluation of Neural versus Phrase-Based Machine Translation for 9 Language Directions. *Proceedings of the 15th Conference of the European Chapter of the Association for Computational Linguistics: Volume 1, Long Papers*, 1063–1073.

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