Cochrane plain language summaries:

A study of authors' satisfaction and users' comprehension

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Background and motivation (1)

- **Cochrane**: a not-for-profit organisation providing high-quality health information on the impact of treatments and surgical interventions by means of **systematic reviews**.

- **Plain language summaries (PLS)** summarise and simplify systematic reviews for the lay public.

- Volunteer authors manually checking and implementing **different sets of simplification guidelines**:
  - difficult and time-consuming task (Temnikova 2012; Aikawa et al. 2007).

- Contradictions, inconsistencies and vagueness:
  - reduced readability of PLS (Karačić et al. 2017; Flodgren 2016).

Cochrane

Background and motivation (2)

- Introducing **technological support**/assistance for authors might:
  - (i) increase their satisfaction;
  - (ii) ensure higher consistency and clarity of simplification rules, thus making texts more comprehensible (Leroy et al. 2013).

- **Acrolinx:** a tool which ensures comprehensibility
  - by automatically checking texts against a set of simplification rules, e.g. on style, tone of voice, and terminology;
  - by proving suggestions and examples (Rodríguez Vázquez 2016).

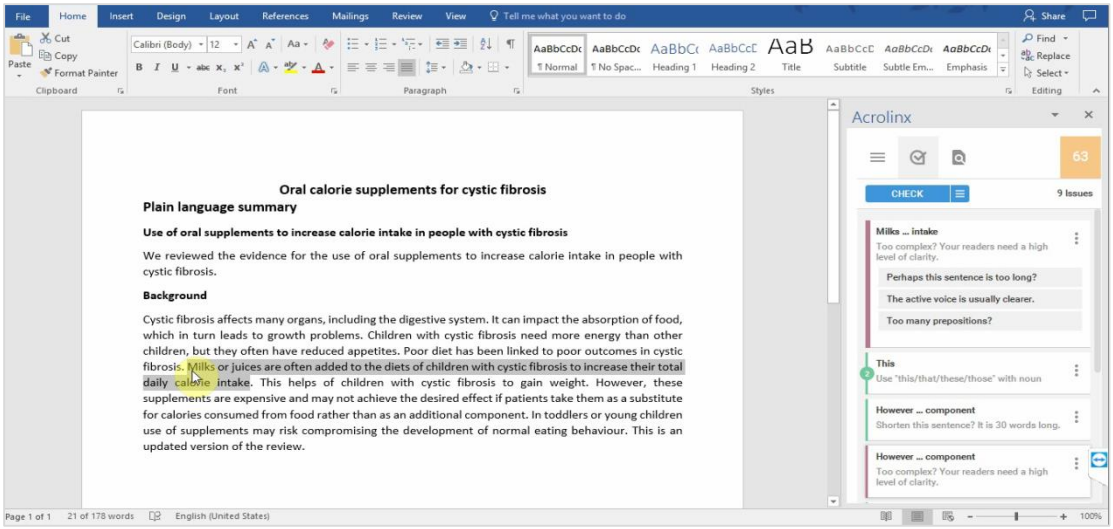
acrolinx

Research questions

- Does integrating Acrolinx into Cochrane's standard workflow of PLS production
  - increase Cochrane volunteer authors' satisfaction?
  - facilitate reading comprehension of Cochrane PLS among lay public?

Characteristics of the integration

- Acrolinx as a plugin in Microsoft Word



- 12 Cochrane authors asked to use Acrolinx
  - to check for readability/comprehensibility issues in their PLS (previously produced by following Cochrane guidelines);
  - to revise the PLS accordingly.

METHOD(S) AND PARTICIPANTS

- **Authors' satisfaction**: System Usability Scale (SUS) (Brooke 1996) and follow-up preference questions
  - 10 statements, Likert scale;
  - the higher the SUS score, the higher the satisfaction.

  - 12 Cochrane authors (health professionals)

- **Reading comprehension**: ratings and (free and cued) recall (Crossley and McNamara 2016)
  - free recall: everything a reader can remember about a text;
  - cued recall: everything a reader can remember about a specific theme/section of the text;
  - controlling for reading skills and prior knowledge.

  - 59 native speakers of English and 23 non-native speakers of English (no health background)
  - Within-subjects design: pre-Acrolinx PLS, post-Acrolinx PLS and abstract (non-simplified summary/baseline) per reader

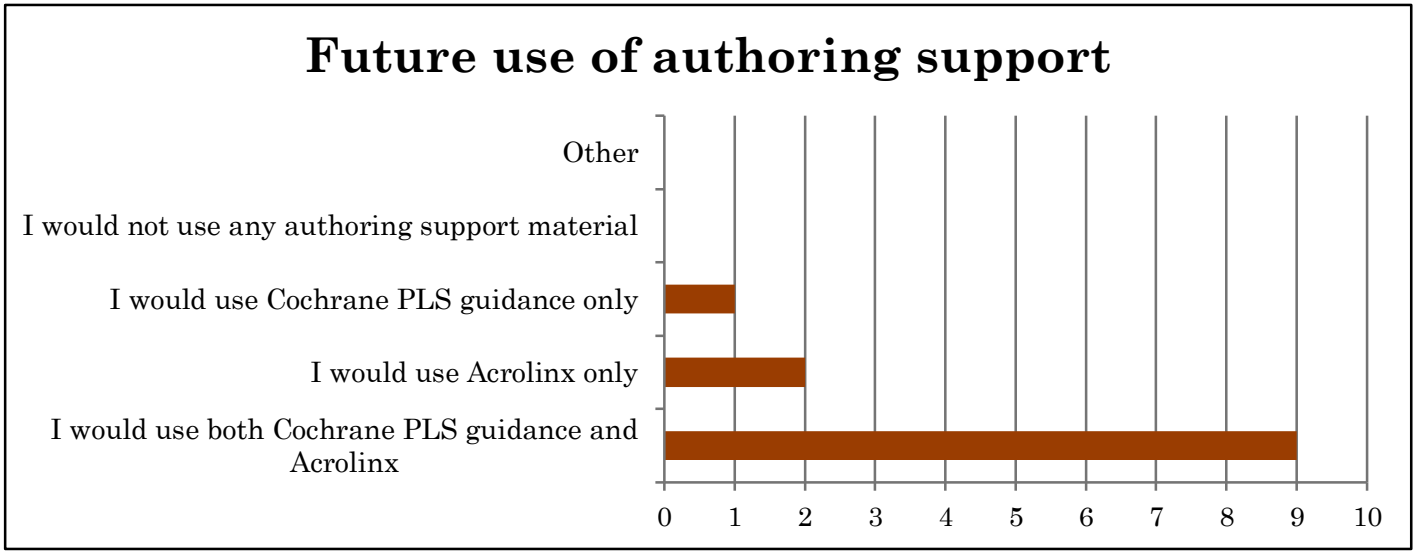
Findings on authors' satisfaction (1)

- On average, Cochrane authors were more satisfied with Acrolinx (M=**75.41**, SD=14.49) than with Cochrane sets of guidelines (M=**62.29**, SD=26.53).

- The difference was not statistically significant, t(11)=1.25, p=0.23.

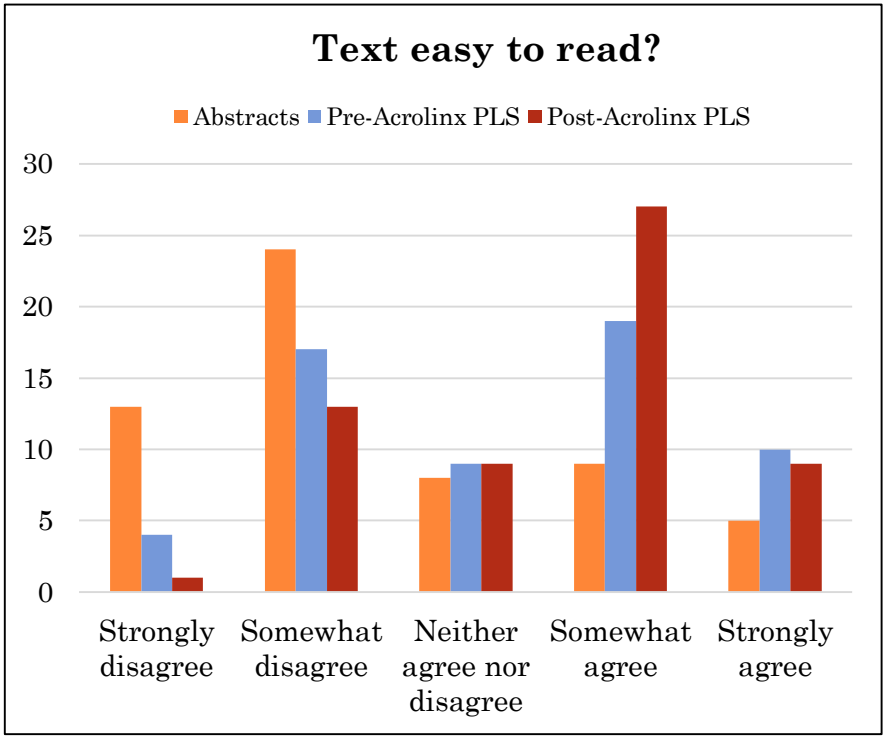
Findings on authors' satisfaction (2)

- Authors showed a preference for using Acrolinx **in combination** with Cochrane PLS guidelines in the future.

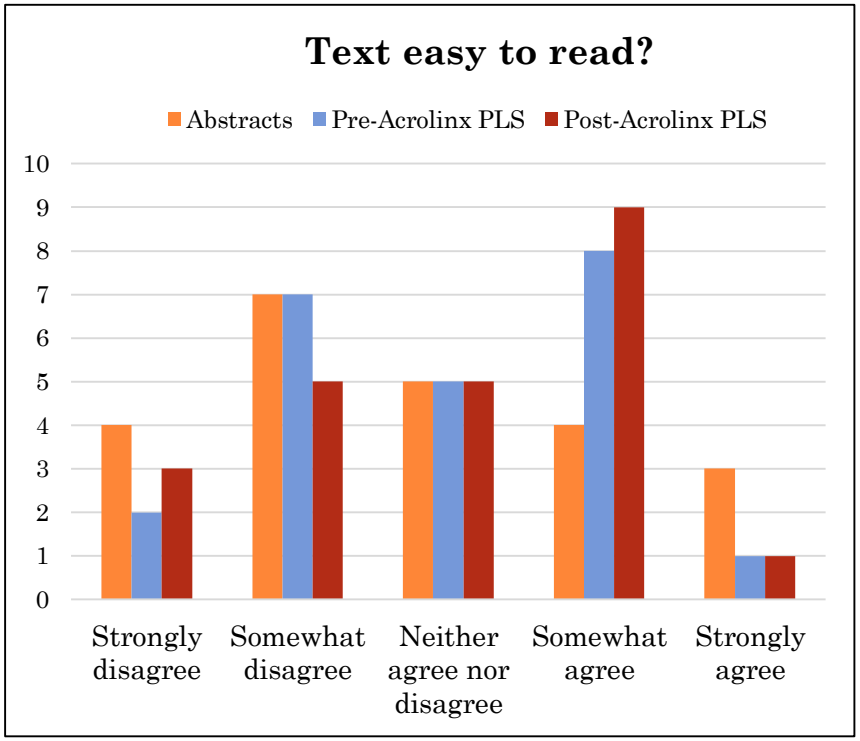


- All authors recognised the need for support when simplifying content.

Findings on reading comprehension (ratings)



Native speakers



Non-native speakers

- In both groups, compared with pre-Acrolinx PLS, slightly higher number of participants who found post-Acrolinx PLS easy to read;
- Most native and non-native speakers (strongly or somewhat) disagreed with the fact that abstracts were easy to read.

Findings on reading comprehension (free and cued recall) (1)

(*) and (**): statistically significant differences (at 0.05 significance level), as shown by within-subjects ANOVAs and follow-up pairwise comparisons.

Free recall, native speakers of English

Corpora	Free recall score *Mean (SD)*
Pre-Acrolinx PLS	13.39 (7.59) (*)
Post-Acrolinx PLS	12.87 (7.28) (**)
Abstracts (baseline)	9.08 (5.21) (*) (**)

Cued recall, native speakers of English

Corpora	Cued recall score *Mean (SD)*
Pre-Acrolinx PLS	14.9 (9.09) (*)
Post-Acrolinx PLS	15.72 (12.58) (**)
Abstracts (baseline)	29.77 (21.4) (*) (**)

Free recall, non-native speakers of English

Corpora	Free recall score *Mean (SD)*
Pre-Acrolinx PLS	8.36 (5.09) (*)
Post-Acrolinx PLS	8.26 (5.38) (**)
Abstracts (baseline)	5.26 (4.05) (*) (**)

Cued recall, non-native speakers of English

Corpora	Cued recall score *Mean (SD)*
Pre-Acrolinx PLS	6.3 (8.25) (*)
Post-Acrolinx PLS	7.68 (9.4) (**)
Abstracts (baseline)	26.45 (29.97) (*) (**)

Findings on reading comprehension (free and cued recall) (2)

- For both native and non-native speakers, the **introduction of Acrolinx did not prove beneficial** in terms of reading comprehension of PLS.

- Comprehension of **abstracts** (as assessed via **free recall**) was **significantly lower** than comprehension of both corpora of PLS.

- Comprehension of **abstracts** (as assessed via **cued recall**) was **significantly higher** than comprehension of PLS, possibly as a result of the following characteristics of abstracts:
  - increased use of bold headings to signal specific themes/sections;
  - increased cohesion between headings and content of sections;
  - reduced length of sections.

Findings on reading comprehension (free and cued recall) (3)

- For both the native and non-native sample, the within-subjects ANCOVAs on free and cued recall including the covariates (reading skills and prior knowledge*) were not significant.
  - Free recall, native speakers of English: $F(1.638, 91.719)=1.263$, $p=\mathbf{0.283}$, $\eta_p^2=0.022$.
  - Cued recall, native speakers of English: $F(2, 114)=0.267$, $p=\mathbf{0.766}$, $\eta_p^2=0.005$.
  - Free recall, non-native speakers of English: $F(2, 40)=0.581$, $p=\mathbf{0.564}$, $\eta_p^2=0.028$.
  - Cued recall, non-native speakers of English: $F(2,40)=0.597$, $p=\mathbf{0.556}$, $\eta_p^2=0.029$.
- However, none of the two covariates had significant effects on free and cued recall scores ($p>0.05$).

**Prior knowledge excluded as a covariate from the ANCOVA on cued recall of native speakers because it did not meet the assumption of homogeneity of regression slopes.*

Implications and future work

- Identifying a simplification scenario that boosts authors' satisfaction might lead them to simplify more health content for the lay public.
- Possible characteristics of the integration of Acrolinx:
  - Cochrane sets of guidelines to be used at the summarisation stage;
  - Acrolinx to be used at the simplification stage.
- Need to test other authoring support tools and their impact on comprehension, to reduce the vulnerability of lay users of health content.
- Need to further investigate the relative impact of reading skills and prior knowledge on comprehension.
- Overall, simplification is beneficial in terms of comprehension, but other text characteristics can further enhance comprehensibility, e.g. formatting, layout, or content segmentation (Rusko et al. 2012; Tait et al. 2005; Frost et al. 1999).

Thank you for your attention!

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References

- Aikawa, T., Schwartz, L., King, R., Corston-Oliver, M. and Lozano, M. 2007. Impact of controlled language on translation quality and post-editing in a statistical machine translation environment. *IN*: Maegaard, B. (ed.) *Proceedings of the Machine Translation Summit XI*. Copenhagen, Denmark, 10-14 September. European Association for Machine Translation, pp. 1-7.

- Brooke, J. 1996. SUS – A quick and dirty usability scale. *Usability Evaluation in Industry,* 89(194), pp. 4-7.

- Crossley, S. A. and McNamara, D. S. 2016. Text-based recall and extra-textual generations resulting from simplified and authentic texts. *Reading in a Foreign Language*, 28(1), pp. 1-19.

- Flodgren, G. 2016. Are Cochrane plain language summaries plain? *IN: Abstracts of the 24th Cochrane Colloquium. Challenges to Evidence-Based Health Care and Cochrane*. Seoul, Korea, 23-27 October. Available at: https://goo.gl/hk5HLG [Accessed 9 August 2018].

- Frost, M. H., Thompson, R. and Thiemann, K. B. 1999. Importance of format and design in print patient information. *Cancer Practice*, 7(1), pp. 22-27.

- Karačić, J., Buljan, I., Hren, D., Dondi, P. and Marušić, A. 2017. Readability of different formats of information about Cochrane systematic reviews: A cross sectional study. *IN: Abstracts of the 9th Croatian Cochrane Symposium*. Split, Croatia, 9-10 June. Available at: https://bit.ly/2vRRZTF [Accessed 9 August 2018].

- Leroy, G., Kauchak, D. and Mouradi, O. 2013. A user-study measuring the effects of lexical simplification and coherence enhancement on perceived and actual text difficulty. *International Journal of Medical Informatics*, 82(8), pp. 717-730.

- Rodríguez Vázquez, S. 2016. *Assuring Accessibility during Web Localisation: An Empirical Investigation on the Achievement of Appropriate Text Alternatives for Images*. PhD thesis. University of Geneva.

- Rusko, E., Van der Waarde, K. and Heiniö, R. L. 2012. Challenges to read and understand information on pharmaceutical packages. *IN:* Singh, J. (ed.) *Proceedings of the 18th IAPRI World Packaging Conference*. Lancaster, Pennsylvania: DEStech Publication, pp. 79-85.

- Tait, A. R., Voepel-Lewis, T., Malviya, S. and Philipson, S. J., 2005. Improving the readability and processability of a pediatric informed consent document: Effects on parents' understanding. *Archives of Pediatrics and Adolescent Medicine*, 159(4), pp. 347-352.

- Temnikova, I. 2012. *Text Complexity and Text Simplification in the Crisis Management Domain*. PhD thesis. University of Wolverhampton.