NRW-FORSCHUNGSKOLLEG
ONLINE-PARTIZIPATION

When the Scale is Unclear

Analysis of the Interpretation of Rating Scales in Human Evaluation of Text Simplification

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Research Questions

RQ1: How to carry out human text simplification evaluation?

RQ2: How do the raters interpret the rating scales?

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RQ2: How do the raters interpret the rating scales?

Text Simplification Evaluation

Manual Evaluation

- Main three rating dimensions (Alva-Manchego etal. (2020a))
  - Grammaticality (or fluency)
  - Simplicity
  - Meaning preservation (or adequacy)

- Comprehension studies (Lapan etal. (2021)):
  - Participants read either a original or a simplified text
  - Afterwards they answer questions related to the content of the text
  - Analysis if the questions were answered better with the original or simplified text

Simplicity

“Is the output simpler than the input?”

Sulem etal. (2018a): HSplit

absolute simplicity

Štajner etal. (2016): QATS

Structural simplicity

Sulem etal. (2018b): PWKP test

“Does the generated sentence(s) simplify the complex input?”

Narayan & Gardent (2014)

“The simplified sentence is easier to understand than the original sentence.”

Alva-Manchego etal. (2020b): ASSET;
Scialom etal. (2021): HL+SL

“How many successful lexical or syntactic paraphrases occurred in the simplification?”

Xu etal. (2016)

“How much simpler is sentence 2 than sentence 1?”

Schwarzer etal. (2021): Fusion

Simplicity - Scales

“Is the output simpler
than t

-2 - +2

Sulem etal. (2018

1 | 2 | 3
bad | ok | good

Štajner etal. (2016): QATS

Structural simplicity

Sulem etal. (2018b):
PWKP test

“Does the generated sentence(s) simplify the complex input?”

Narayan & Gardent (2014)

“The simplified sentence is easier
to understa

0 - 100
strongly disagree –
strongly agree

Alva-Manche
Scialom etal.

“How many successful lexical or syntactic paraphrases occurred in the simplification?”

Xu etal. (2016)

“How much
sentence 2 tha

-2 - +2
Much less simpler
– much simpler

Schwarzer etal. (2021): Fusion

Simplicity – Rating Groups

“Is the output simpler
than

3 experts

Sulem etal. (2018

ba

?

Štajner etal. (2016): QATS

Structural simplicity

Sulem etal. (2018b):
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0

strong
strongly

12-35 crowd workers

Alva-Manche
Scialom etal.

“How many successful lexical or syntactic paraphrases occurred in the simplification?”

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Much
– much si

3 crowd workers

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Text Simplification Evaluation

RQ1: How to carry out human text simplification evaluation?

- The judgments are collected…
  - … on scales with different sizes, i.e., 3, 5 and 100,
  - … on scales with different point names, i.e., ”good” to ”bad” or ”strongly disagree” to ”strongly agree”
  - … by crowd workers or experts
  - … on different item types, i.e., questions or statements

Text Simplification Evaluation

RQ1: How to carry out human text simplification evaluation?

- The judgments are collected…
  - … on scales with different sizes, i.e., 3, 5 and 100,
  - … on scales with different point names, i.e., ”good” to ”bad” or ”strongly disagree” to ”strongly agree”
  - … by crowd worker
  - … on different item

Best practices of
human text simplification evaluation
are missing.

Research Questions

RQ1: How to carry out human text simplification evaluation?

RQ2: How do the raters interpret the rating scales?

Rating of Aligned Sentence Pairs

Original Sentence

"The collapsed Dome of the main church has been restored entirely."
(ASSET #287)

Simplified Sentence

"The Dome has been restored."
(ASSET #287)

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Original Sentence

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Simplified Sentence

"The Dome has been restored."
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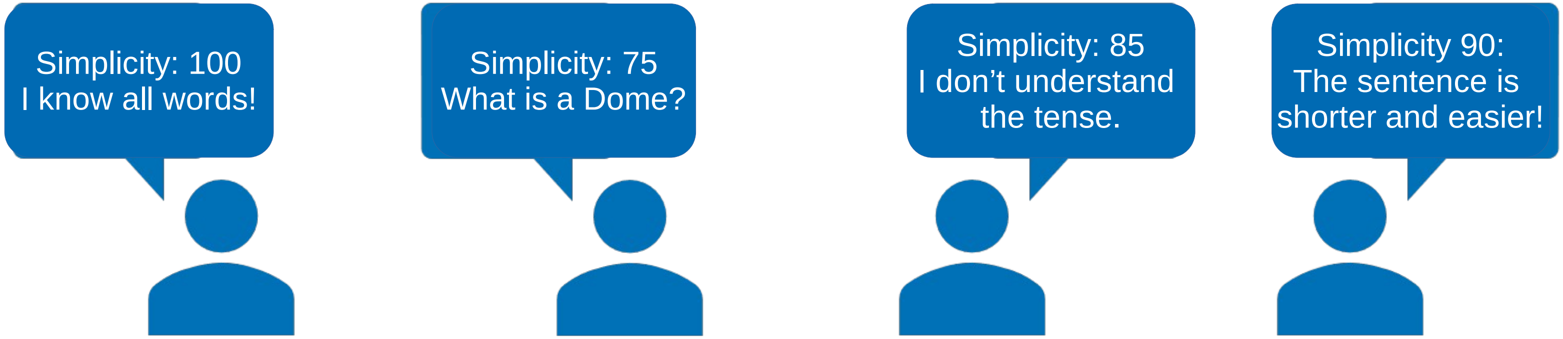


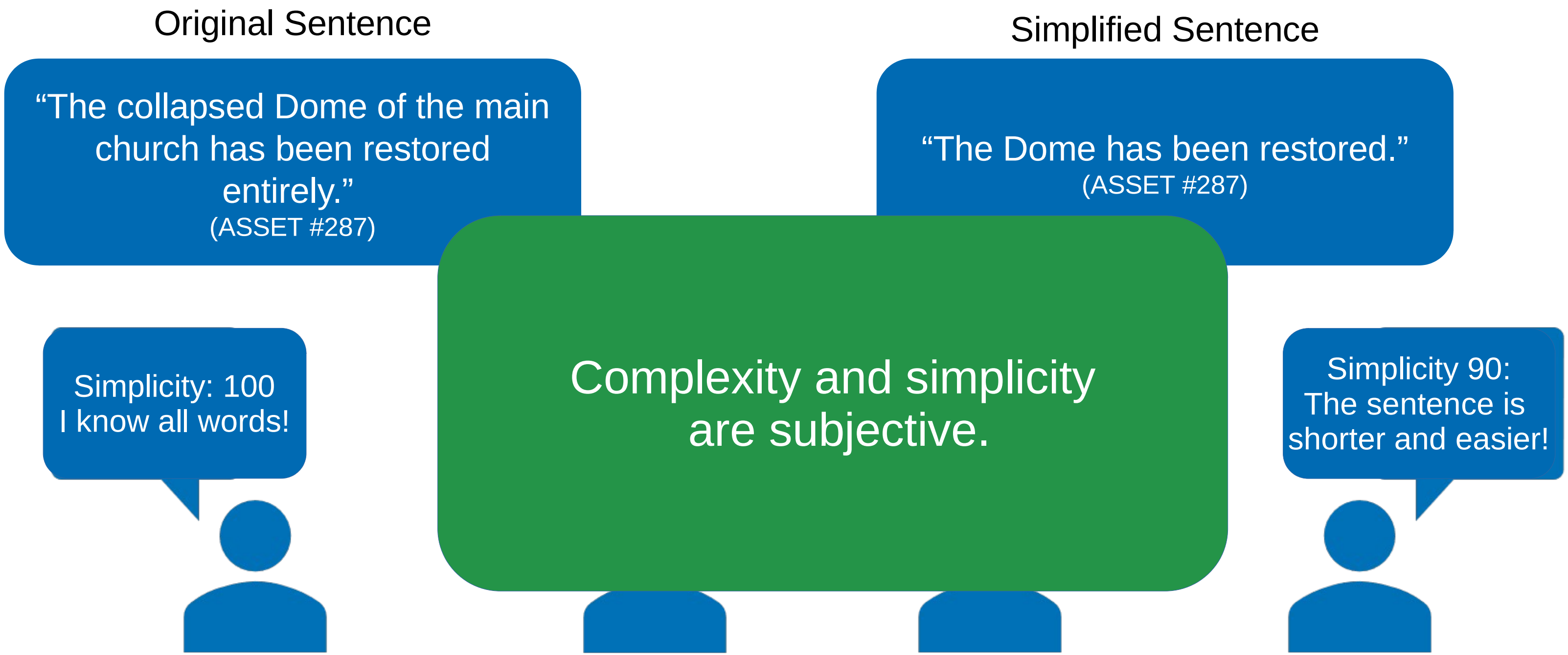
Simplicity: 100
I know all words!

Simplicity: 75
What is a Dome?

Simplicity: 85
I don't understand the tense.

Simplicity 90:
The sentence is shorter and easier!

Rating of Aligned Sentence Pairs



Original Sentence

“The collapsed Dome of the main church has been restored entirely.”
(ASSET #287)

Simplified Sentence

“The Dome has been restored.”
(ASSET #287)

Simplicity: 100
I know all words!

Complexity and simplicity are subjective.

Simplicity 90:
The sentence is shorter and easier!

Rating of no-change Pairs

Original Sentence

“Their eyes are quite small, and their visual Acuity is poor.”
(ASSET #90)

Simplified Sentence

“Their eyes are quite small, and their visual Acuity is poor.”
(ASSET #90)

Absolute simplicity ratings of the simplified sentence are still subjective.

But,
relative simplicity ratings of no-change pairs should be the same.

Rating of no-change Pairs

Original Sentence

“Their eyes are quite small, and their visual Acuity is poor.”
(ASSET #90)

Simplified Sentence

“Their eyes are quite small, and their visual Acuity is poor.”
(ASSET #90)

- Simplicity Rating:
  - As simple as before, but could be worse
  - Not easier to understand than before , worst case

- Rate with neutral scale element?
- Rate with lowest scale element?

It depends on the rating scale and its definition.

Data

	QATS Štajner etal. (2016)	**HSplit** Sulem etal. (2018a)	**PWKP test** Sulem etal. (2018b)	**ASSET** Alva-Manchego etal. (2020b)	**system-likert** Scialom etal. (2021)	**human-likert** Scialom etal. (2021)	**Fusion** Schwarzer etal. (2021)
# sentence pairs	631	1960	500	100	151	108	2920
# no-change sentence pairs	107	346	20	5	2	3	338
# no-change in %	16.96	17.65	4	5	0.97	1.35	11.58
# no-change pair raters		3	5	23	19	30	3
# no-change annotation records	321	1384	80	225	90	126	2028

Data

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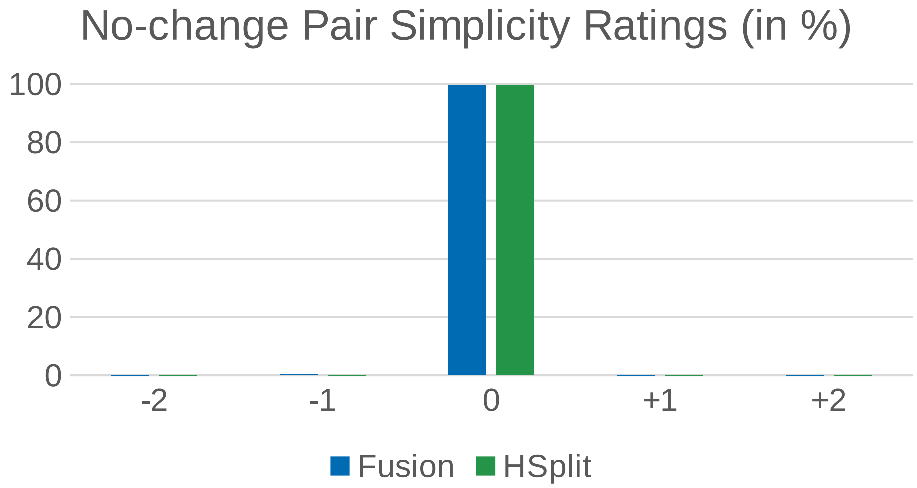
Hypotheses

Hypothesis 1

In HSplit and Fusion, the **simplicity** rating of no-change pairs are equal to the **neutral element, i.e., 0**.



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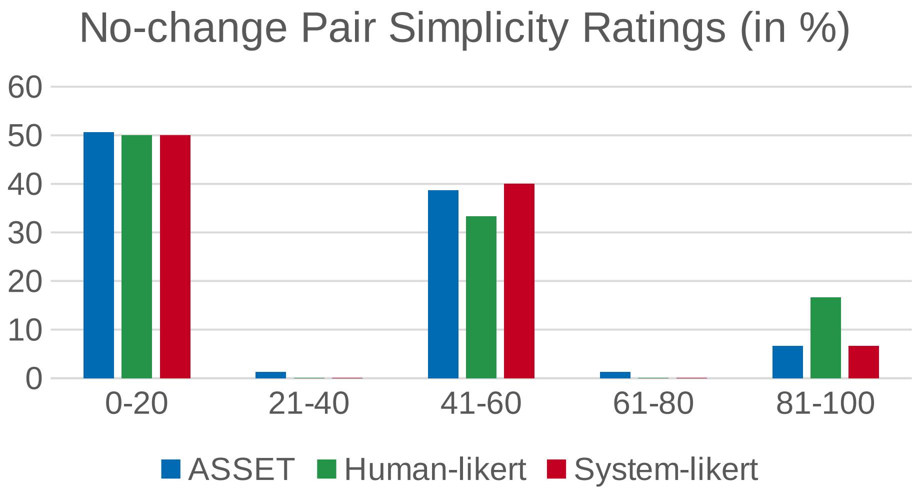
Hypotheses

Hypothesis 2

In ASSET, human-likert, and system-likert, the **simplicity** ratings of no-change pairs are equal to the **lowest element of the scale, i.e., 0**, as it indicates the worst simplification.



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Hypotheses

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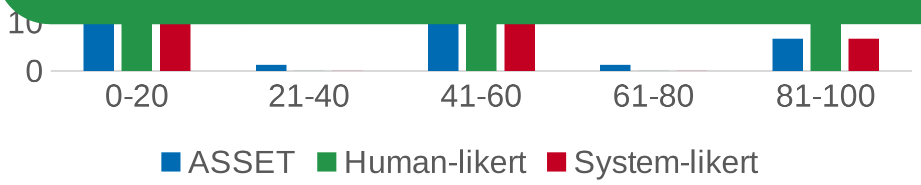
Different scale interpretations?



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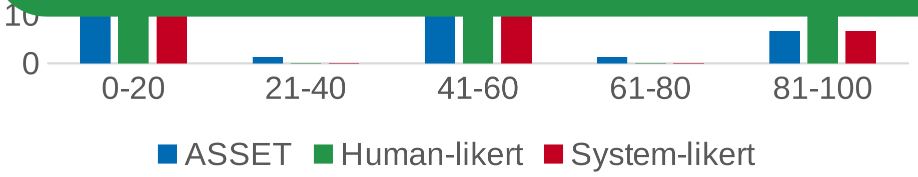

Different scale interpretations?
Either...

- ...0 for higher complexity and <u>**0**</u> for same complexity, or
- ...0 for higher complexity and <u>**50**</u> for same complexity

Hypotheses

Hypothesis 4

If **different interpretations** of the scales exist, the rater groups’ ratings significantly **differ** for sentence pairs in which the original and the simplified sentences are **not identical**.

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If **different interpretations** of the scales exist, the rater groups’ ratings significantly **differ** for sentence pairs in which the original and the simplified sentences are **not identical**.

- We compare ratings of annotators, who rated more than one no-change pair of ASSET or human- and system-likert.
  - ASSET: 20 rater
  - human+system likert: 16 rater
- Does annotators prefered a rating over all their no-change pairs?

Hypotheses

Hypothesis 4

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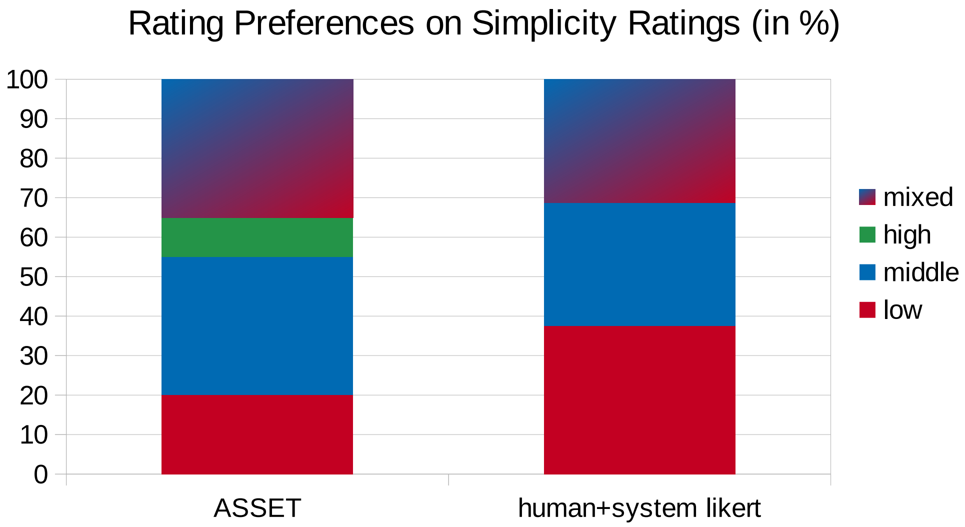

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Hypotheses

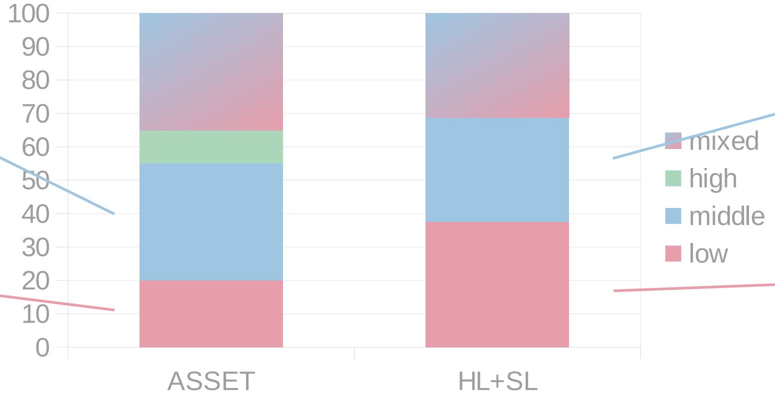
Hypothesis 4

If **different interpretations** of the scales exist, the rater groups' ratings significantly **differ** for sentence pairs in which the original and the simplified sentences are **not identical**.

- Average of rating scores of non-identical sentence pairs by annotators, who annotated more than one no-change pair.

n_{raters}: 6
$n_{ratings}$: 292
Avg.: 44.43
STD: 33.22

n_{raters}: 7
$n_{ratings}$: 571
Avg.: 35.58
STD: 37.24



n_{raters}: 5
$n_{ratings}$: 634
Avg.: 63.77
STD: 33.88

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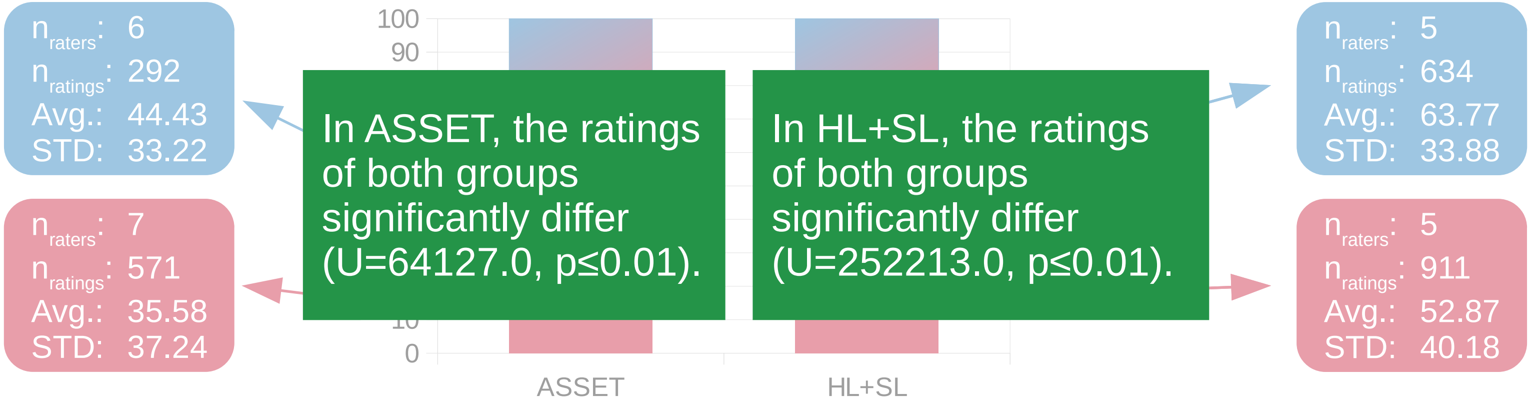

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In ASSET, the ratings of both groups significantly differ (U=64127.0, p≤0.01).

In HL+SL, the ratings of both groups significantly differ (U=252213.0, p≤0.01).

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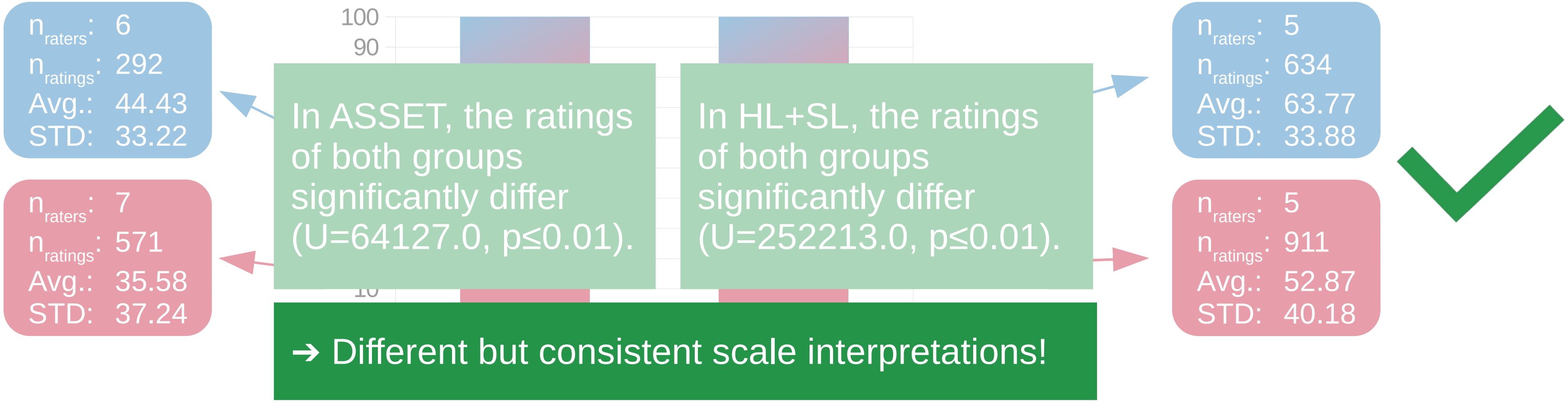

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➔ Different but consistent scale interpretations!

Conclusion

- Simplicity ratings on a rating scale from -2 to +2 rated by crowd workers and experts are consistent.
- Simplicity ratings on a rating scale from 0 to 100 with crowd workers are not consistent.
  - ➔ The scales are unclear.
  - ➔ Neutral element might be helpful to make them more clear.
  - ➔ Different scale interpretations exist.
- The rater can be grouped by their different scale interpretations.
  - – The ratings are consistent per group.
  - – The ratings of the groups differ significantly.
  - – The complete ratings of the corpora, might be split regarding the raters‘ scale interpretation.

Conclusion II

- We should be aware of different scale interpretations and inconsistency in the human judgements.
- The unclear scales might influence human and automatic text simplification evaluation.
- The analysis of no-change pairs can be used a sanity check, if the ratings scales are interpreted as expected.
- The meaning preservation scales on all corpora have more consistent ratings.
    - ➔ The meaning preservation scales seem easier to understand than the simplicity scales.

Discussion & Future Work

- More analysis on (best) ratings scales for text simplification is required.
- Recommendations or best practices on how to evaluate TS are required.
- Some open points for the best practices:
    - Which scale statement should we recommend?
    - Which scale size should we recommend?
    - Should we recommend a scale with or without neutral element?
    - Should we recommend to ask experts or crowd workers?
    - Should we recommend to validate the ratings and the scale interpretation of the annotators by analyzing the no-change pairs as kind of a sanity check?

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Analysis of the Interpretation of Rating Scales in Human Evaluation of Text Simplification

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The code of the analysis will be available on github soon:
https://github.com/rstodden/TS-scale-interpretation