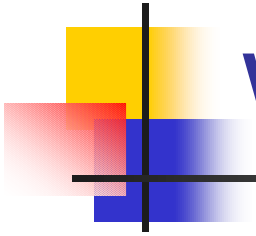
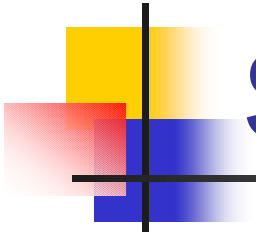
Computer Aided Text Summarization

Using SweSum in a Real Newspaper Production Environment



Why?

- Sydsvenskan needs a tool such that:
  - Reporters can easily shorten their articles
  - The editorial staff can adjust an article into a limited space
  - Articles can be shortened and sent via SMS/WAP technology

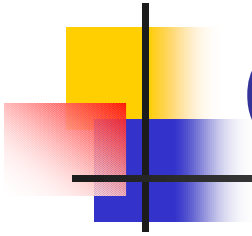


Strategy

- Carry out measurements on real data
- Simulate the results with SweSum
- Perform a quantitative comparison
- Perform a qualitative investigation
- Propose ways for improvement

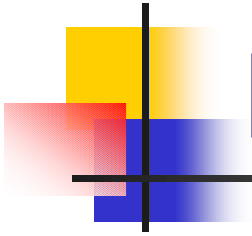
Measurements on Real Data

- No access to data during the revisions
- Access to data before publishing
- Access to data after publishing
- Concentration on the work of the editorial staff
- Draw feasibility conclusions about SMS/WAP if possible



Crude Data

- 308 articles
- 64 articles with <500 characters
- 177 with >500 and <2500
- 67 with <2500

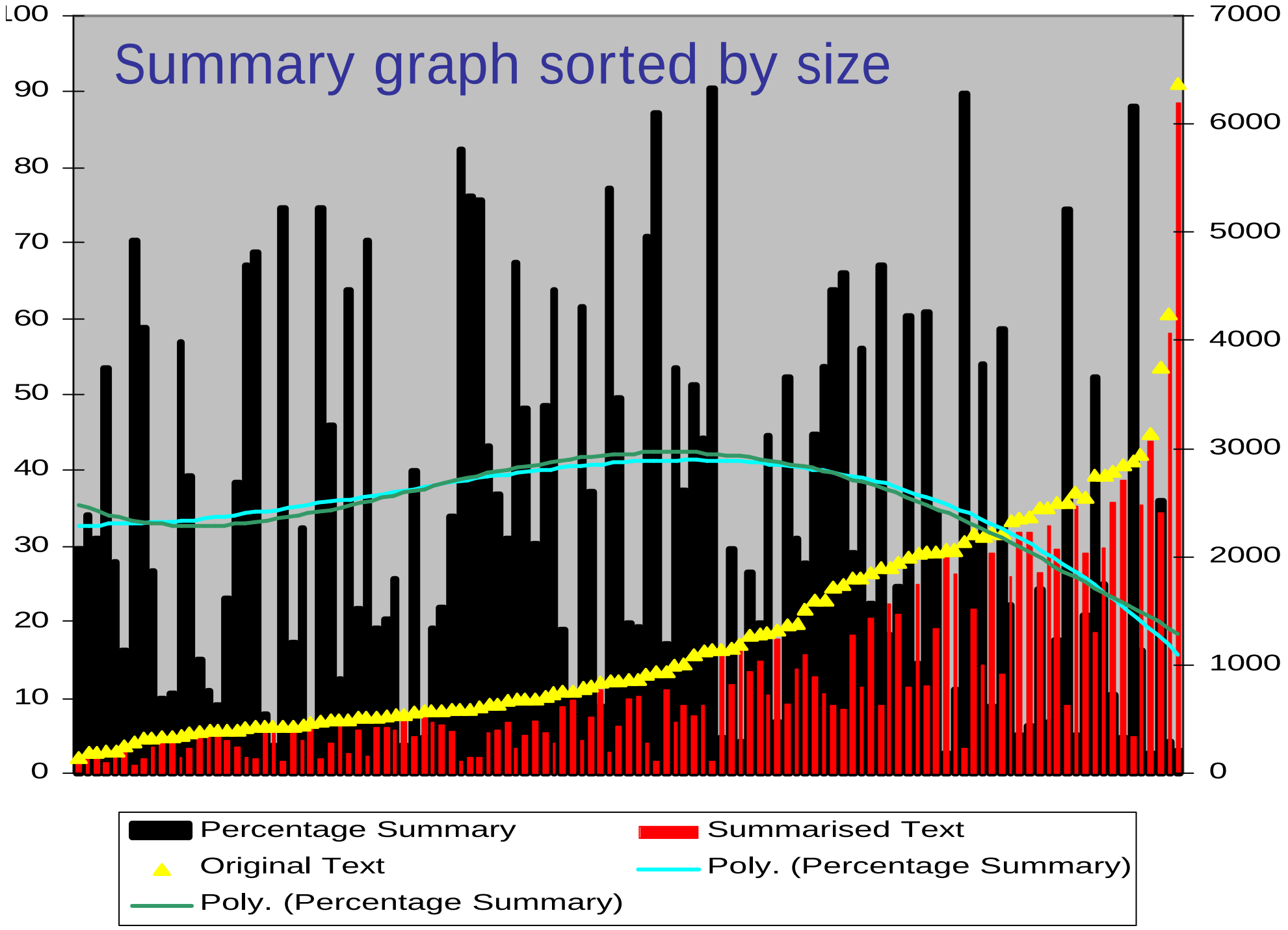


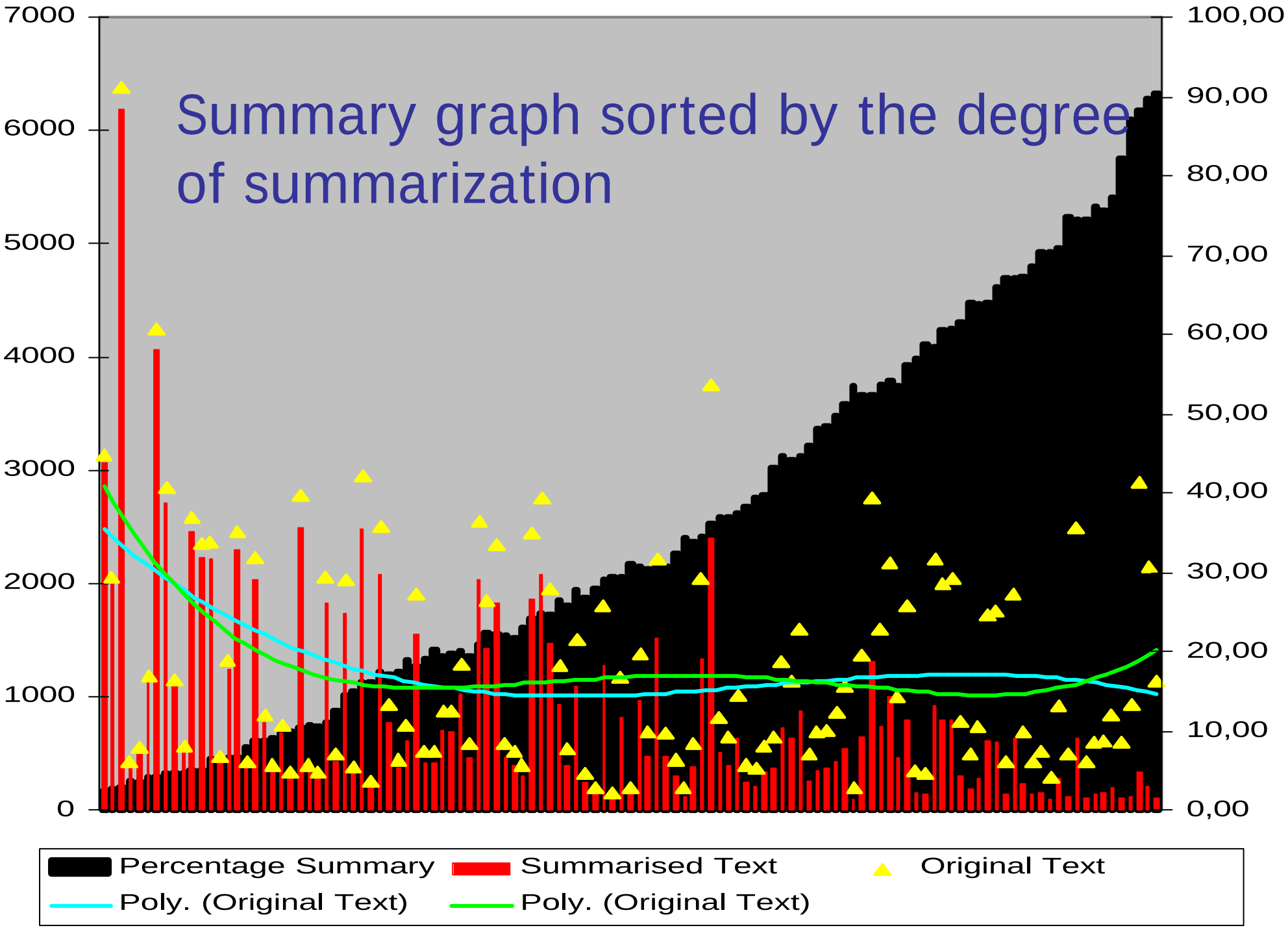
More About Crude Data

- 119 out of 308 were shortened
- Share of summarizations: 39%
- Average degree of summarization: 35%
- Maximal degree of summarization: 90%

More About Crude Data

- Degree of summarization in section A: 45%
- Degree of summarization in section B: 10%
- Degree of summarization in section C and T: 32%


Summary graph sorted by size
100
90
80
70
60
50
40
30
20
10
0
7000
6000
5000
4000
3000
2000
1000
0
Percentage Summary
Summarised Text
Original Text
Poly. (Percentage Summary)
Poly. (Percentage Summary)


Summary graph sorted by the degree of summarization
7000
6000
5000
4000
3000
2000
1000
0
100,00
90,00
80,00
70,00
60,00
50,00
40,00
30,00
20,00
10,00
0,00
Percentage Summary
Summarised Text
Original Text
Poly. (Original Text)
Poly. (Original Text)

Simulating the results with SweSum

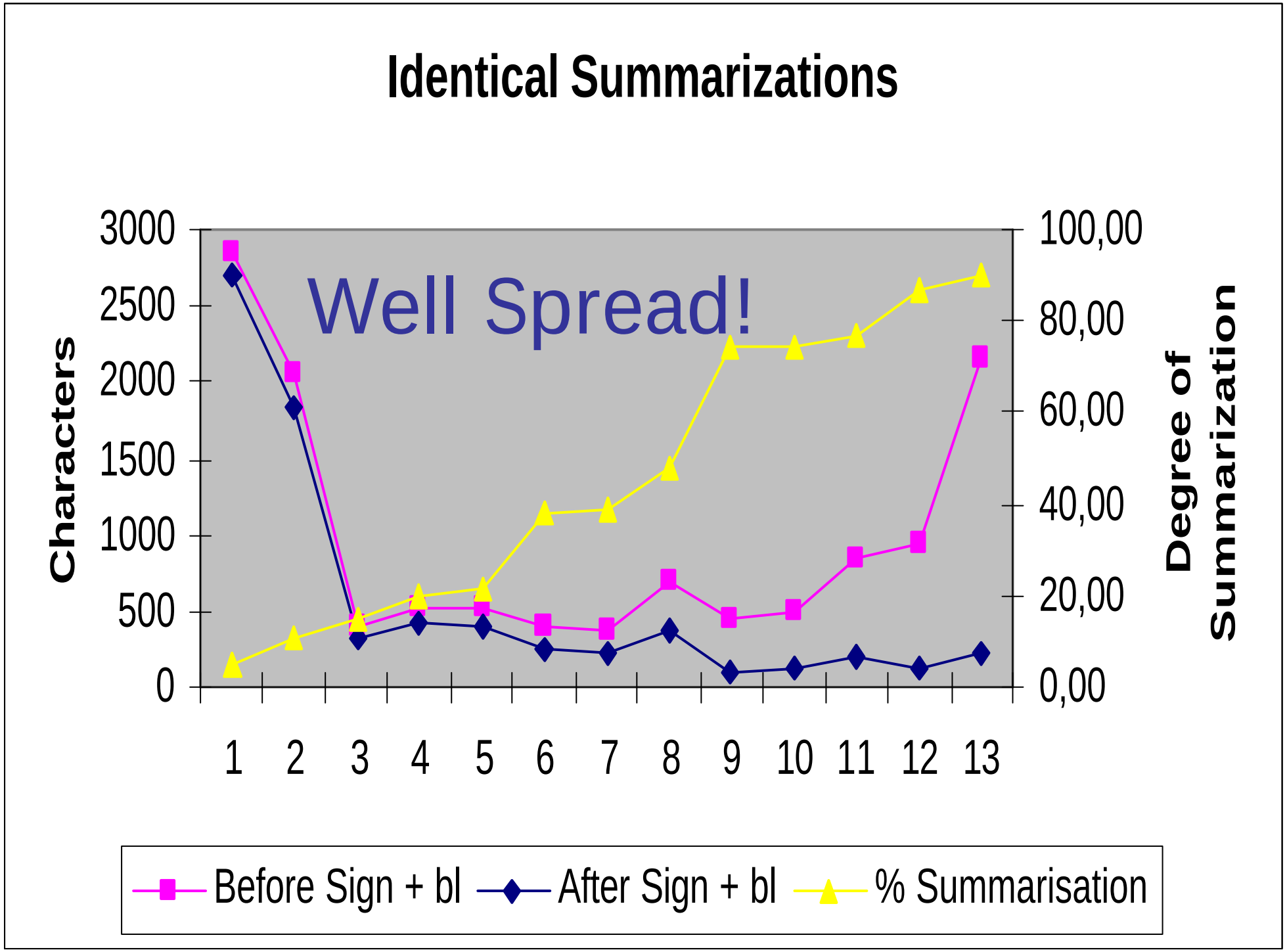
- Utilizing only the basic settings
- Number of characters as close as possible to the manual summarization
- Separating the paragraphs

Quantitative Comparison

- 13 or 11% of the articles were identical
- 106 or 89% of the articles were non-identical
- Amongst the latter, the average length of each manually summarized article is 11 characters longer
- 17 articles differ more than 10%
- Excluding these 17 articles, the discrepancy is just two characters in favour of the manually summarized articles.

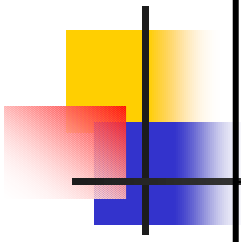
More About Quantitative Comparison

- The manual and the automatic have in average 71% words in common
- Highest common share of words: 100%
- Lowest common share of words: 14%


Identical Summarizations
Well Spread!
Characters
Degree of Summarization
3000
2500
2000
1500
1000
500
0
100,00
80,00
60,00
40,00
20,00
0,00
1 2 3 4 5 6 7 8 9 10 11 12 13
Before Sign + bl
After Sign + bl
% Summarisation

Qualitative Investigation

- The articles were sorted in two different groupings
- 8 persons partook in the study
- 4 different parameters for each summary
- Content, grammar, coherence and content with regards to the original text

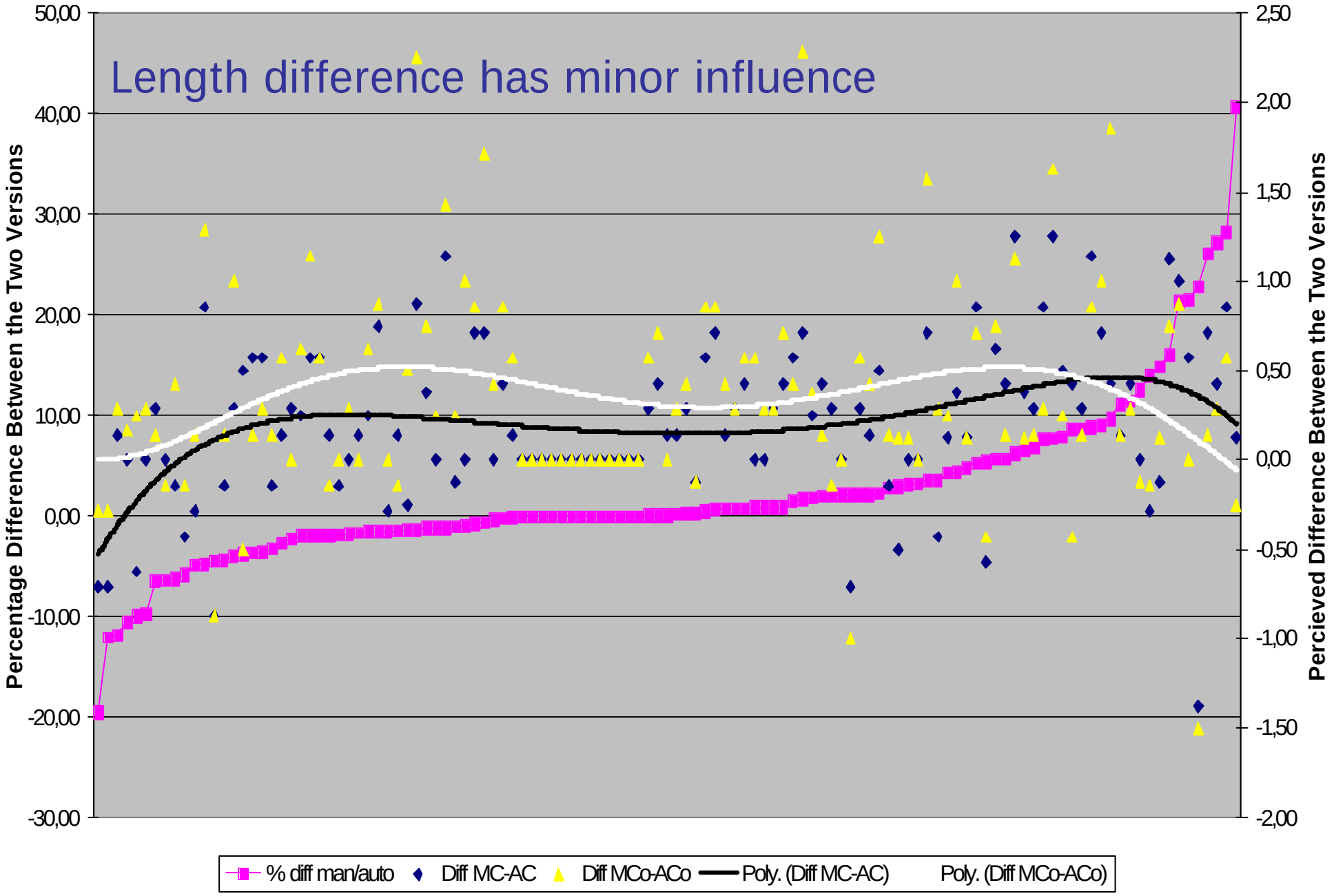


Outline

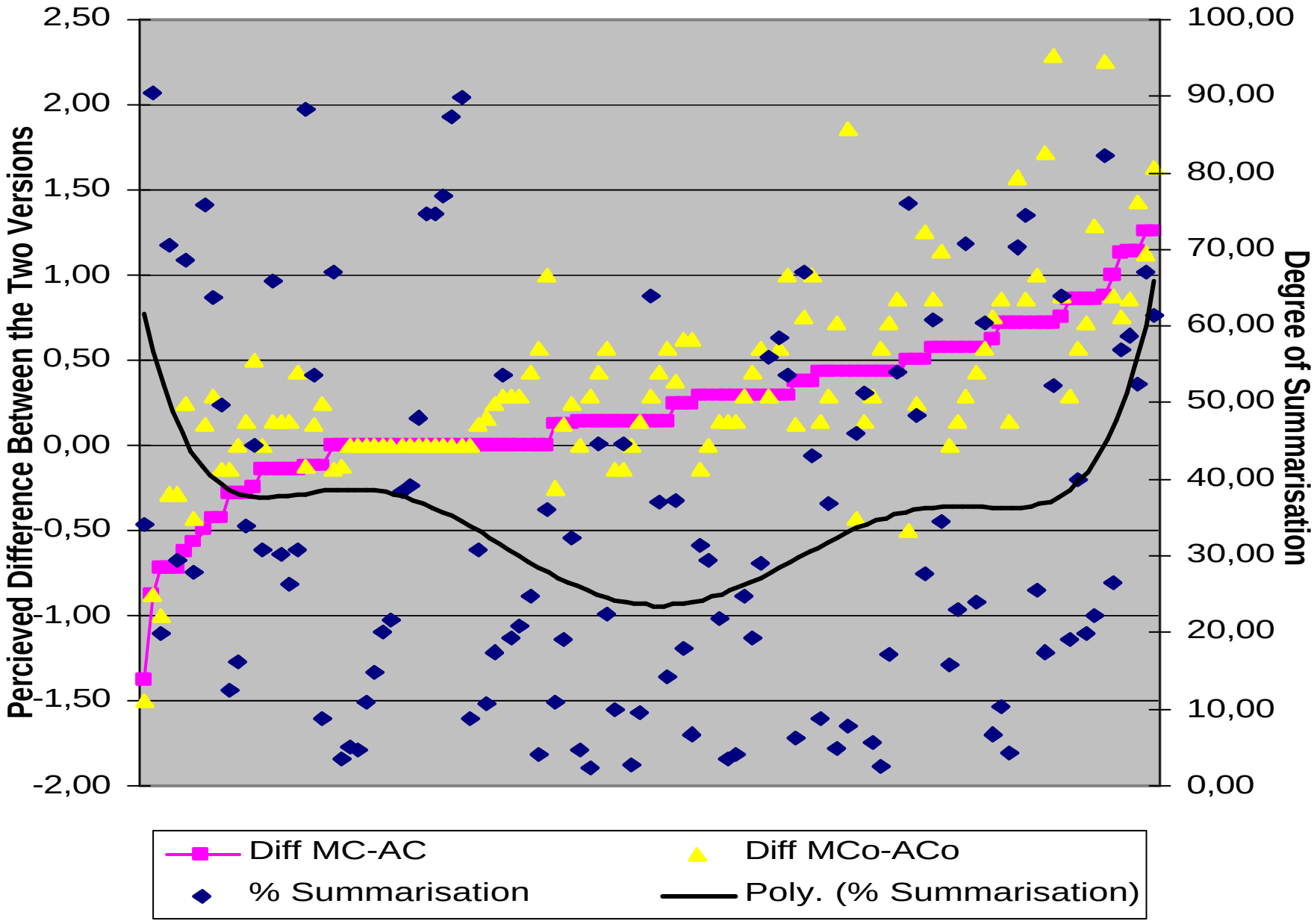
	# Better manually	# Better automatic
Content	71	22
Grammar	53	25
Coherence	81	17
Content w.r.t. Original Text	77	21

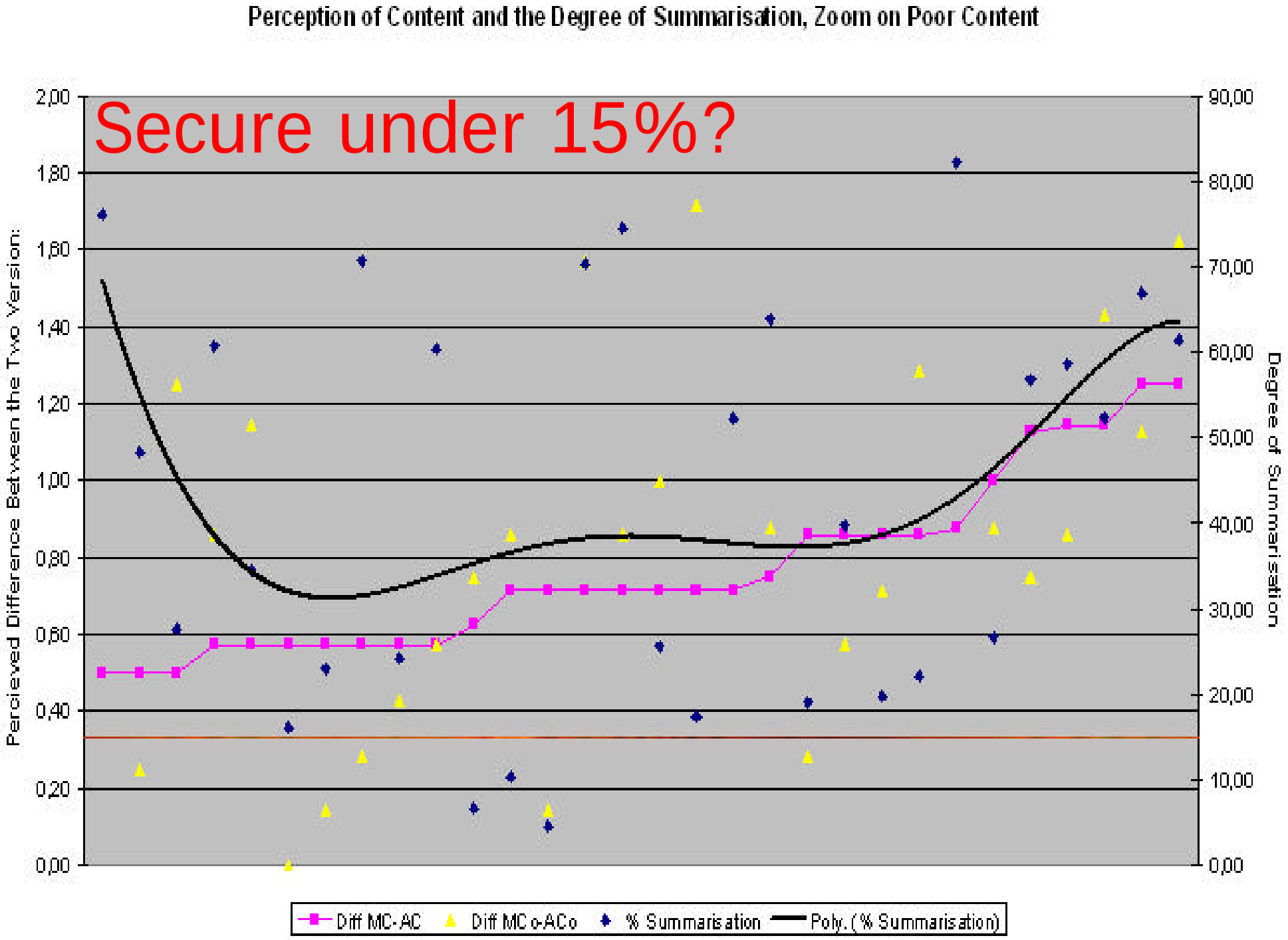
Outline II

	# Manually	# Automatic
All properties better	34	5
At least one property better	98	46
All but grammar better	55	7


The Effect of the Size Difference Between the Manual and Automatic Versions on End Result
Length difference has minor influence
Percentage Difference Between the Two Versions
Percieved Difference Between the Two Versions
50,00
40,00
30,00
20,00
10,00
0,00
-10,00
-20,00
-30,00
2,50
2,00
1,50
1,00
0,50
0,00
-0,50
-1,00
-1,50
-2,00
% diff man/auto
Diff MC-AC
Diff MCo-ACo
Poly. (Diff MC-AC)
Poly. (Diff MCo-ACo)

The Connection Between the Perception of Content and the Degree of Summarisation

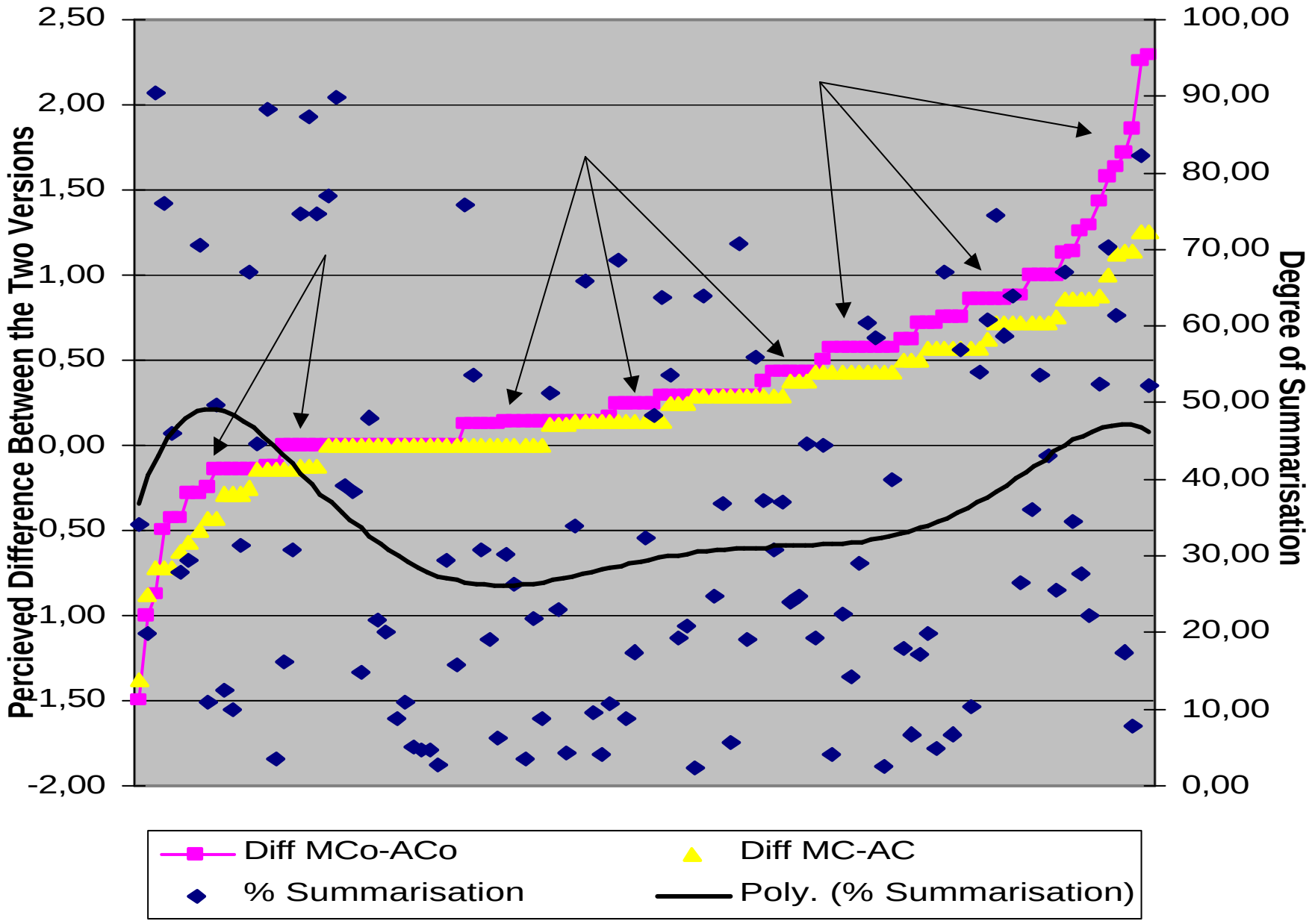


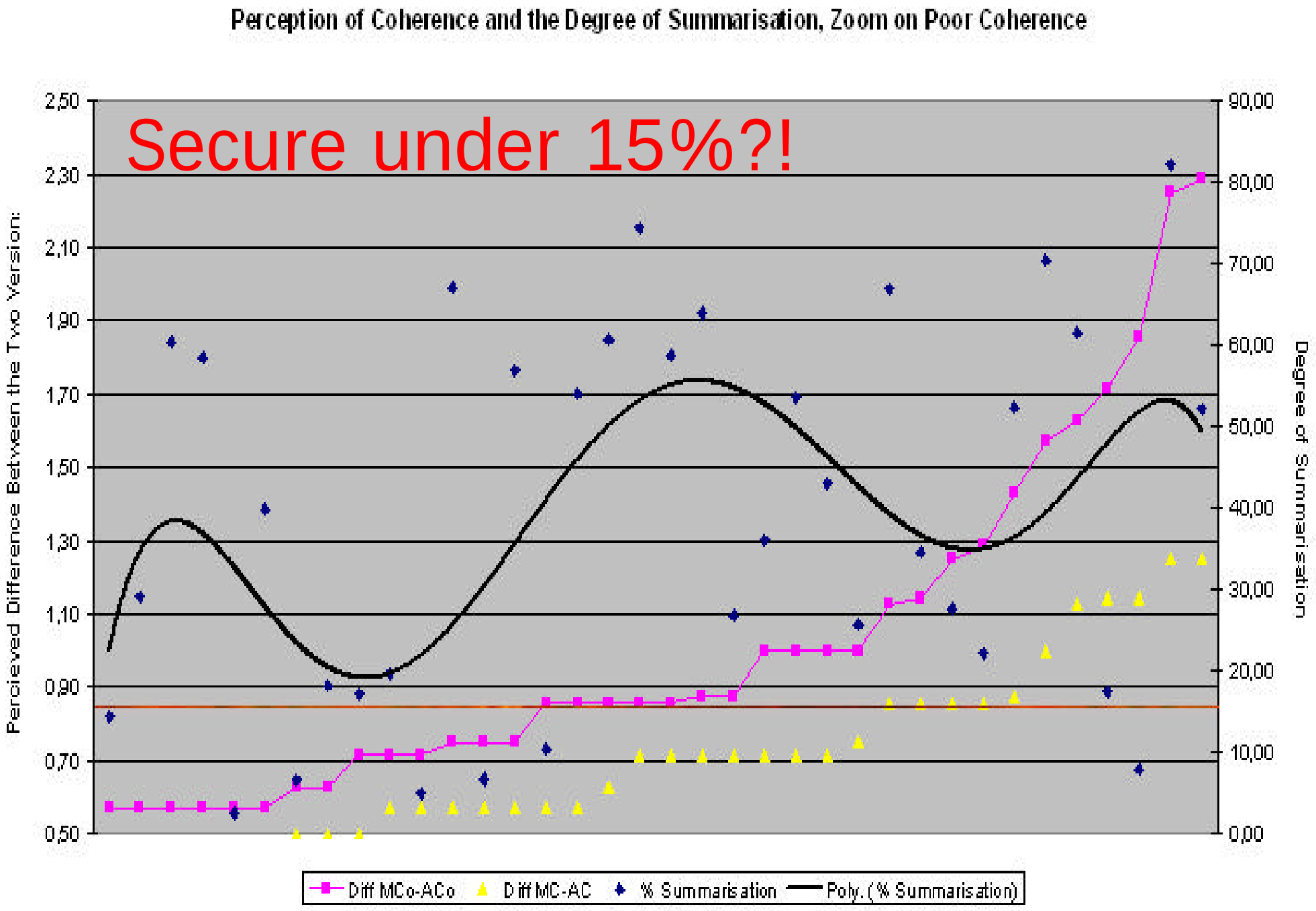

Perception of Content and the Degree of Summarisation, Zoom on Poor Content
Secure under 15%?
Percieved Difference Between the Two Version:
Degree of Summarisation
2,00
1,80
1,60
1,40
1,20
1,00
0,80
0,60
0,40
0,20
0,00
90,00
80,00
70,00
60,00
50,00
40,00
30,00
20,00
10,00
0,00
Diff MC-AC
Diff MC o-ACo
% Summarisation
Poly. (% Summarisation)

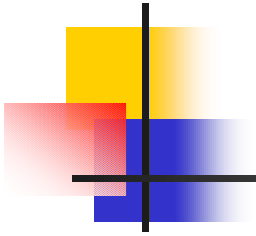
Investigation Results

- 30 articles were viewed as having considerably inferior content with the automatic summary
- 3 articles shortened <15% were considered as having considerably inferior content
- 2 of these had a manual text with over 5% more characters
- 90% of all articles summarized <15% were viewed as having a good content

The Connection Between the Perception of Coherence and the Degree of Summarisation

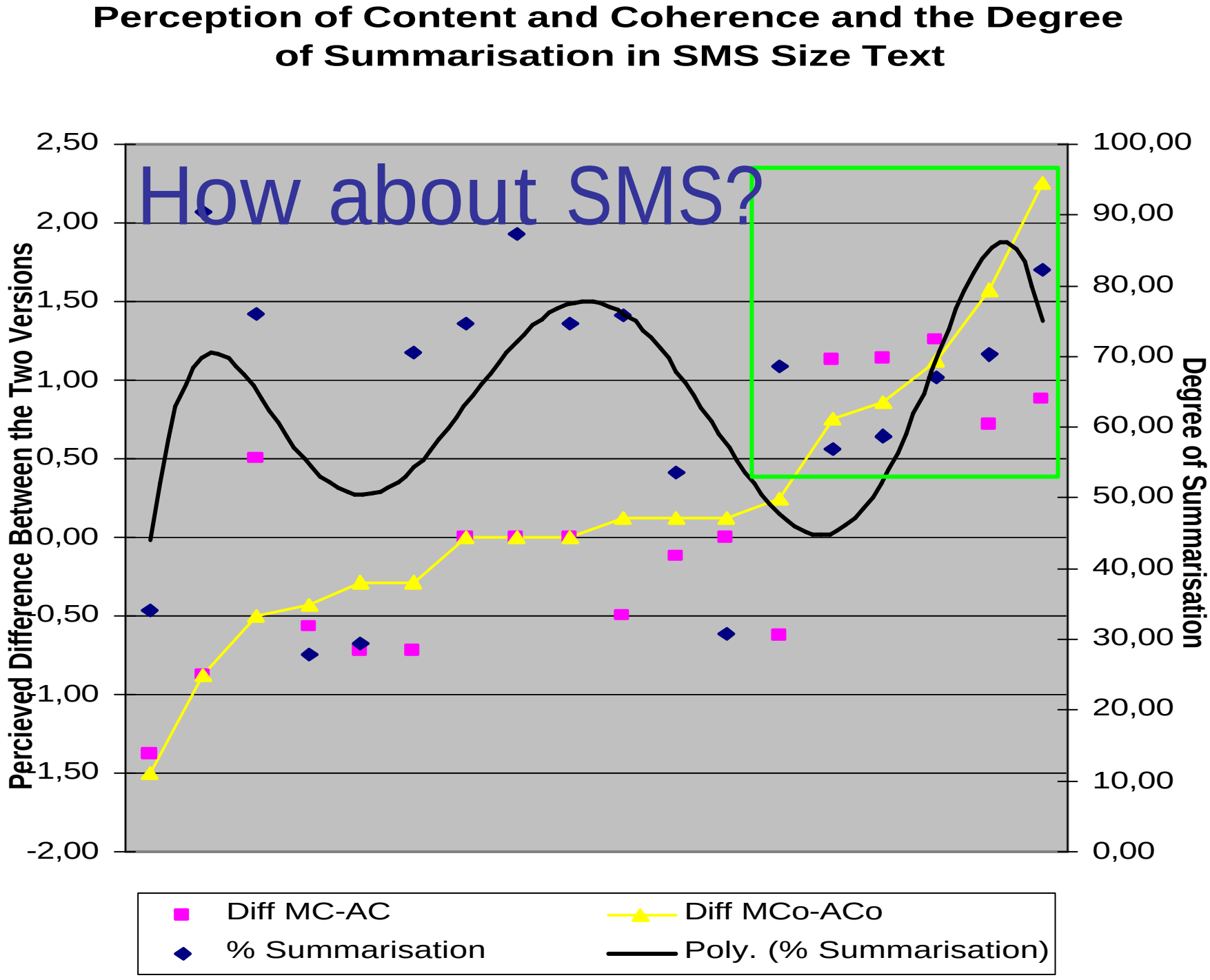


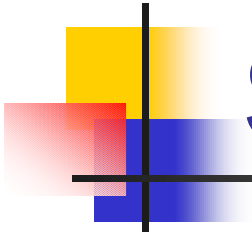

Perception of Coherence and the Degree of Summarisation, Zoom on Poor Coherence
Secure under 15%?!
Percieved Difference Between the Two Version:
Degree of Summarisation
2,50
2,30
2,10
1,90
1,70
1,50
1,30
1,10
0,90
0,70
0,50
90,00
80,00
70,00
60,00
50,00
40,00
30,00
20,00
10,00
0,00
Diff MCo-ACo
Diff MC-AC
% Summarisation
Poly. (% Summarisation)



Investigation Results

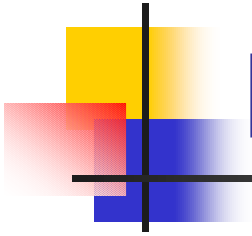
- 36 articles were viewed as having considerably inferior coherence with the automatic summary
- 7 articles shortened <15% were considered as having considerably inferior coherence
- 2 of these had a manual text with over 5% more characters
- 76% of all articles summarized <15% were viewed as having good coherence


Perception of Content and Coherence and the Degree of Summarisation in SMS Size Text
How about SMS?
Percieved Difference Between the Two Versions
Degree of Summarisation
2,50
2,00
1,50
1,00
0,50
0,00
0,50
1,00
1,50
-2,00
100,00
90,00
80,00
70,00
60,00
50,00
40,00
30,00
20,00
10,00
0,00
Diff MC-AC
Diff MCo-ACo
% Summarisation
Poly. (% Summarisation)



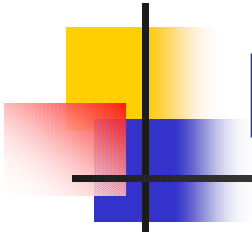
SMS Analysis

- 72% of all articles with SMS size are perceived as good as the manual version
- All those that were viewed as inferior had been summarized at least 56%



Proposals for Improvement

- Many small details lower the grading
- Pronoun substitution as standard
- Ability to cut long sentences into smaller sentences
- The heuristics need revising, example:
- Do not omit the first sentence in a paragraph if any other sentence is being used from that paragraph



Further Study

- The problem with the small bugs has to be immediately addressed
- The heuristic needs to be revised, a rather less generous algorithm is in my view to be preferred
- After implementing these changes another study with the same data should be carried out.

The End