

# Results of Interlab Proficiency Test No. 002 in Handwriting Analysis:

## Evaluation of degree of tension in four different handwritings



### Organization, operation and evaluation

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### Ring Trial Participants

Twenty one graphologists from eight different countries

### Research Materials

- 4 handwritings from 4 different countries (Germany, Belgium, Slovakia, Russia)
- 84 evaluations (4 per handwriting from 21 graphologists)

### Procedure of evaluation

Based on four different detailed definitions of tension grade (example of table per handwriting on the right) each graphologist evaluated four handwritings by ticking one of two different levels (dominant or mediocre present). It was possible to tick different kinds and levels of tension grade per handwriting.

Degree of tension	dominant present	mediocre present
<b>Lack of tension / insufficient contraction</b> Definition: Sloppy movement, neglected forms, restraining movements are too weak, lines oscillating or/and rising, increasing centrifugality		
<b>Medium degree of tension</b> Definition: coordination of movement with simultaneous harmonic integration of form, gentle controlled movement, spaces between lines and words orderly, constant lines, reduced centrifugality		
<b>High degree of tension</b> Definition: Firm forms, inhibited movement, large spaces between words, increasingly centripetal		
<b>Degree of tension too strong</b> Definition: Oscillation of all handwriting elements, cramped and jerky movement, destructed forms		

## Results of Interlab Proficiency Test 002

### 1. Statistical Approach

Firstly, the ordinal scale (four degrees of tension in two levels each) used in this test was transformed into a numerical scale which combines degree and level in one number for better result calculation. The transformation has been performed as follows

- 0.0 - 0.7 = Lack of tension, dominant to mediocre present
- 0.8 - 1.5 = Medium degree of tension, mediocre to dominant present
- 1.6 - 2.3 = High degree of tension, mediocre to dominant present
- 2.4 - 3.0 = Degree of tension too strong, mediocre to dominant present

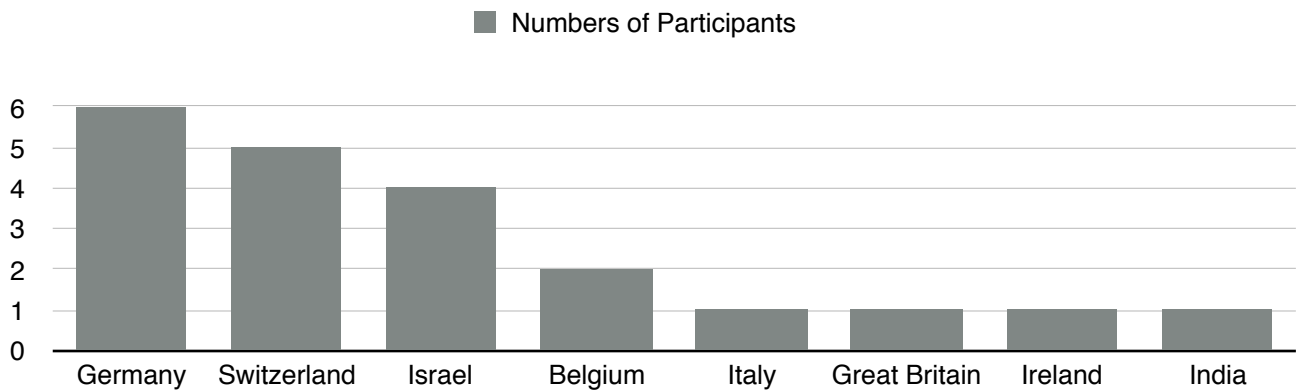
Secondly, different calculations were performed:

- Participants' statistics (countries, gender, years of experience)
- Statistical summary of evaluation of degree of tension
- Frequency distribution of evaluation of degree of tension - all participants and according to country
- Result comparison between all participants (not public and anonymous)

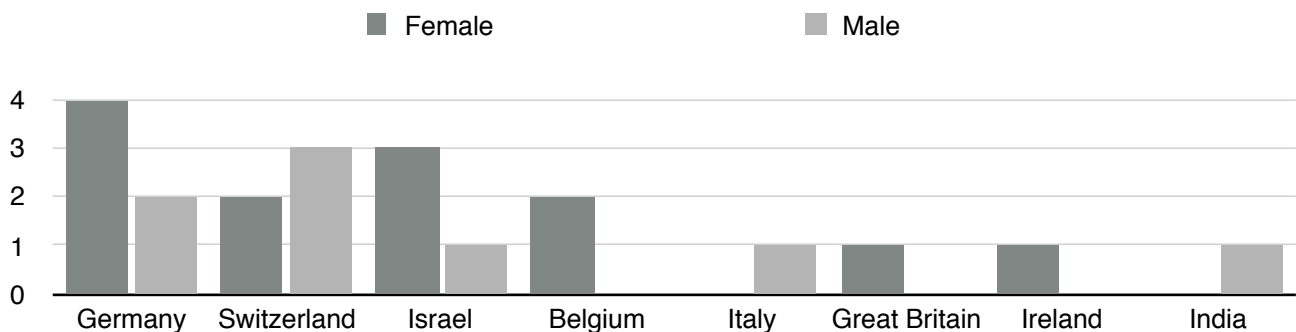
## 2. Result Presentation

### 2.1. Participants' statistics performing evaluations of tension grade

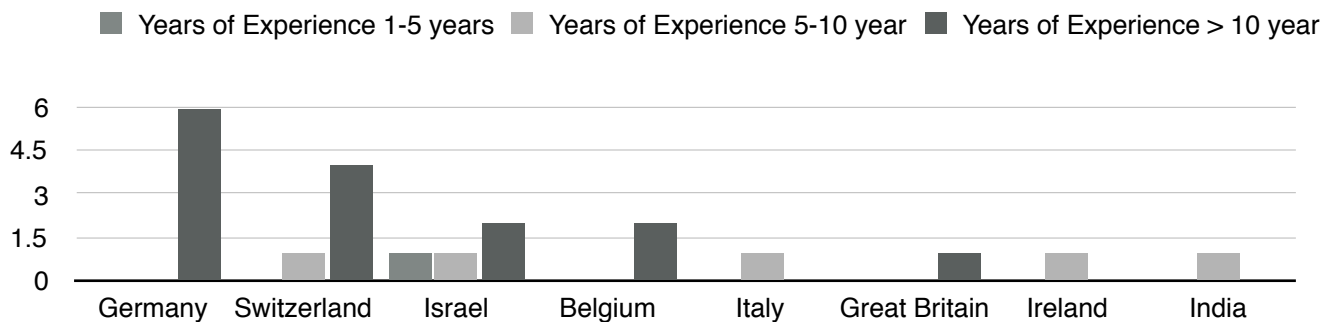
#### 2.1.1. Countries of participants



#### 2.1.2. Gender of participants



#### 2.1.3. Years of experience with handwriting analysis of participants



## 2.2. Statistical summary per handwriting sample

### 2.2.1. Box-and-Whiskers-Diagram

This diagram is a standardized way of displaying the distribution of data based on the following statistical data:

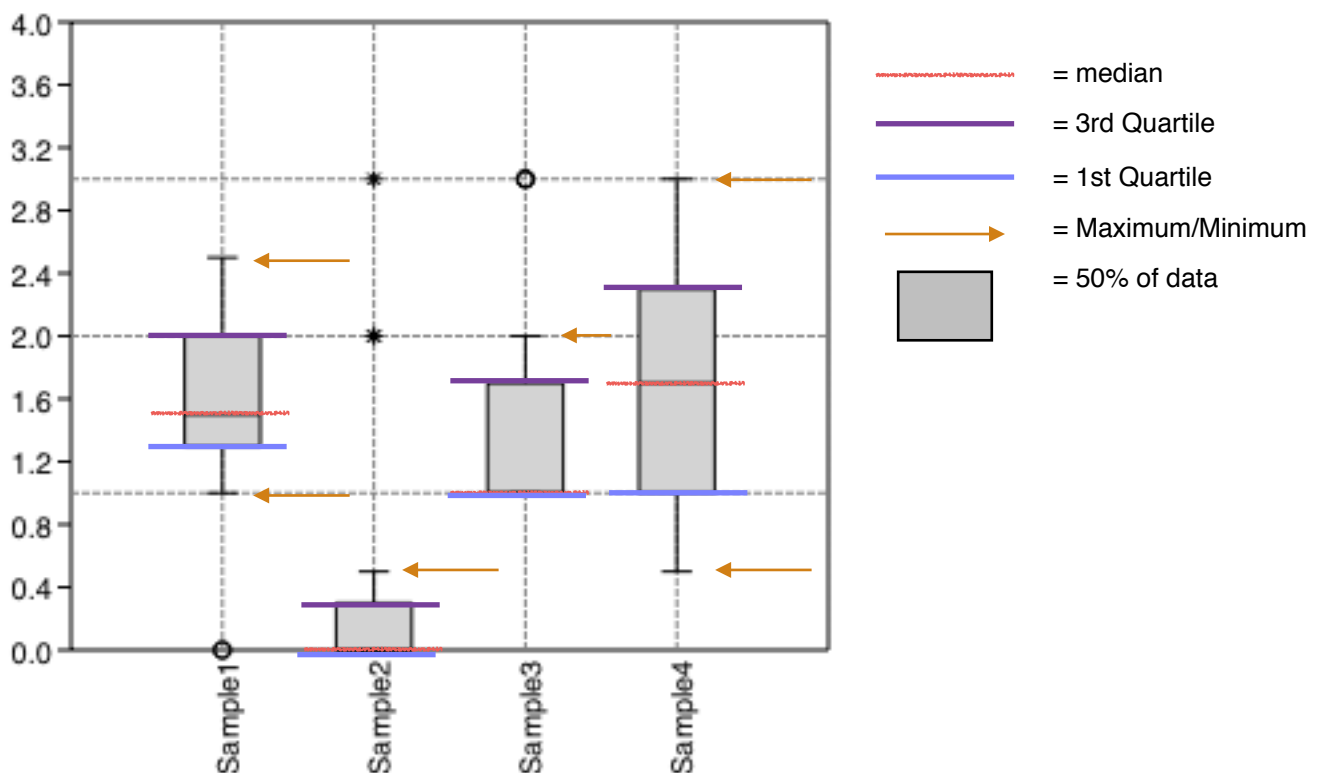
- The gray box represents 50% of the data (between the blue and purple line quartiles). In the gray box (one box per handwriting sample) the red line represents the median (second quartile): 50% of the evaluations are below and above this value. The blue line marks the beginning of the first quartile: 25% of the evaluations have been achieved here. The purple line marks the beginning of the third quartile: 75% of the evaluations have been achieved here. In sample 2 and 3 median coincides with the first quartile and the

minimum value. The closer the distance between the blue and red respectively the red and the purple line, the less results are in this area. The wider the distance, the more results are in this area.

- If the red line is not in the middle of the gray box or does not even exist, it means there is a skewed distribution (e. g. in sample 1 less participants evaluated for a tension grade below 1.5, more for a tension grade above 1.5) or the mean coincides with the first or the third quartile (e. g. in sample 2 and 3)
- The vertical lines outside the gray box are called „whiskers“ and indicate the variability outside the upper and lower quartiles. In our case: One standard deviation above and below the mean of the data. Each area from minimum value to the first quartile respectively from the third quartile to the maximum value contains 25% of the values.
- The black stars (sample no. 2) and dots (sample no. 1 and 3) represent two different kinds of outliers.

The Box-and-Whiskers-Diagram already shows at a first glance that handwriting sample no. 4 could not be identified clearly regarding the degree of tension and had the largest variability compared to the other three samples. Apart from a few outliers handwriting sample no. 2 however was clearly identified with a „dominant lack of tension“ by most of the participants and has the lowest evaluation variability.

Hereafter (section 2.2.2. to 2.2.5.) you will find a detailed listing in numbers of the statistical data shown in the Box-and-Whiskers-Diagram per handwriting.



### 2.2.2. Sample 1

einem Kugelschreiber beschrieben wird, er hätte einen Füller (vermutlich einen edlen) oder einen Bleistift benutzt (dabei hätte er eine Analogie zum Einritzen / Einmeißeln gezeugt, die Ursprünge des Wortes Graphem vor Augen geführt).  
Bis auf schnelle Notizen wird heutzutage sehr selten handschriftlich geschrieben. Ich denke, ich gehöre zu dem ganz wenigem Menschen meiner Generation, die ab und an noch einen Brief schreiben, aber auch ich bin es viel mehr geübt, zu tippen, darunter leidet natürlich auch die Schrift. Dabei trägt die eigene Hand:

N (evaluations)	21
Min. Value	0
Max. Value	2.5
Mean	1.5
Standard deviation	0.6
Median	1.5
25%-quartile	1.3
50%-quartile	1.5
75%-quartile	2

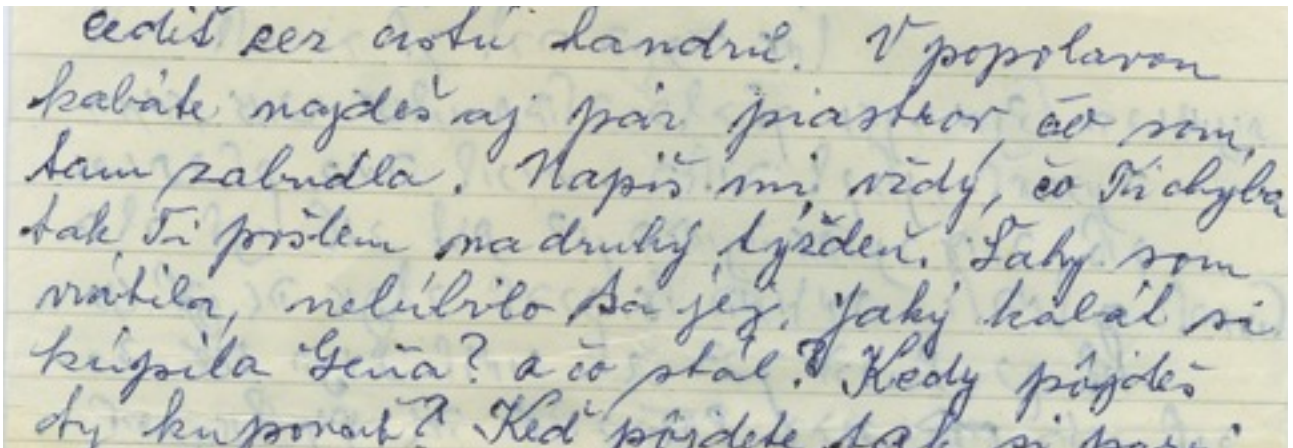
### 2.2.3. Sample 2

égale à l'écriture pour effectuer  
sage et graphologie, histoire  
trouver la foucille de cette  
, et comprendre le qu'on  
écriture peut révéler de la lettre

N (evaluations)	21
Min. Value	0
Max. Value	3
Mean	0.4
Standard deviation	0.8
Median	0
25%-quartile	0

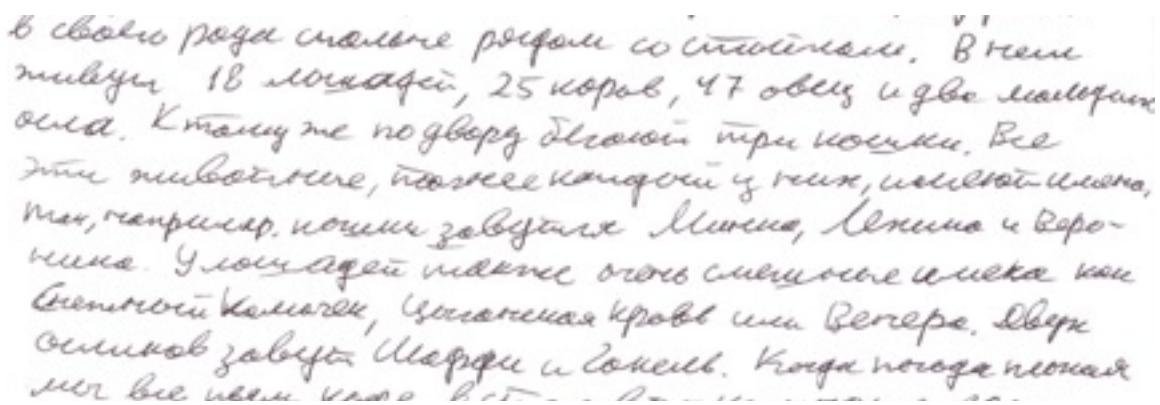
50%-quartile 0  
75%-quartile 0.3

### 2.2.4. Sample 3



N (evaluations) 21  
Min. Value 1  
Max. Value 3  
Mean 1.5  
Standard deviation 0.7  
Median 1  
25%-quartile 1  
50%-quartile 1  
75%-quartile 1.9

### 2.2.5. Sample 4



N (evaluations) 21  
Min. Value 0.5  
Max. Value 3  
Mean 1.7  
Standard deviation 0.8  
Median 1.7

25%-quartile	1
50%-quartile	1.7
75%-quartile	2.5

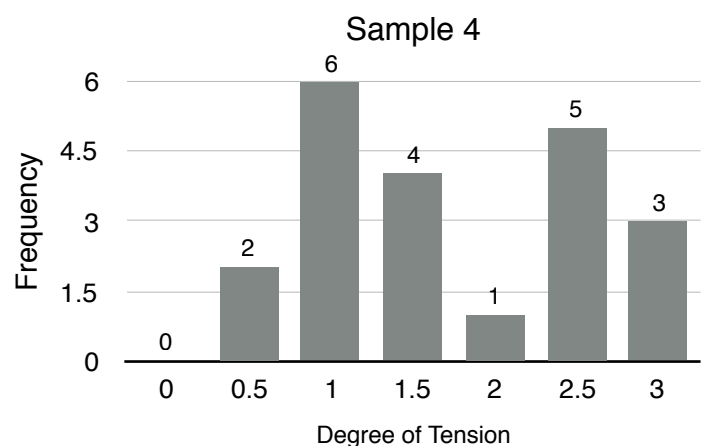
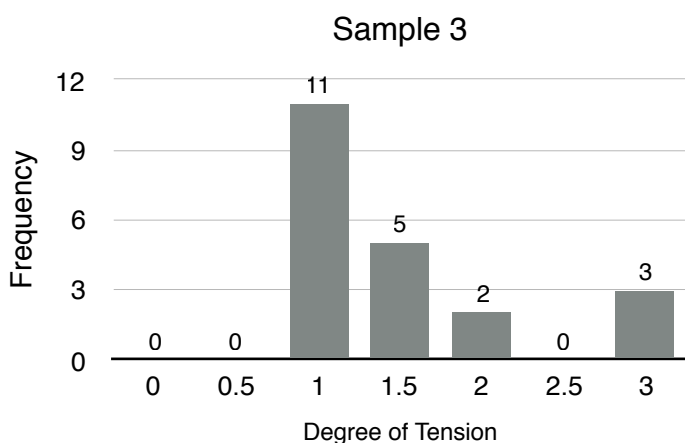
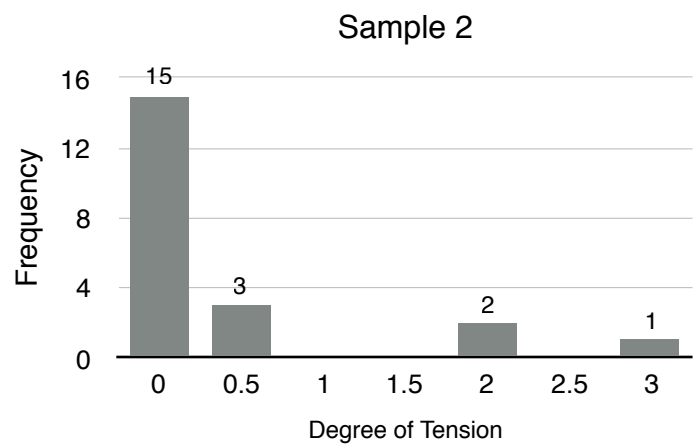
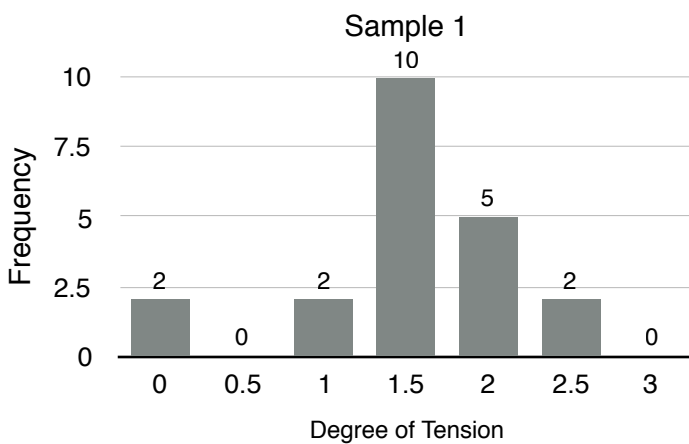
### 2.3. Frequency distribution of evaluations - for all participants | for German-speaking & non-German-speaking countries

As the handwriting sign „degree of tension“ was proposed by the German neurologist und graphologist Dr. Rudolph Pophal in the beginning of the twenties century and as it is since decades a vital element of every graphological training and handwriting analysis in German-speaking countries it is interesting to know if there

was any difference in analysis between German-speaking and non-Germany-speaking countries.

Frequency all participants				
Tension	Sample 1	Sample 2	Sample 3	Sample 4
0	2	15	0	0
0.5	0	3	0	2
1	2	0	11	6
1.5	10	0	5	4
2	5	2	2	1
2.5	2	0	0	5
3	0	1	3	3

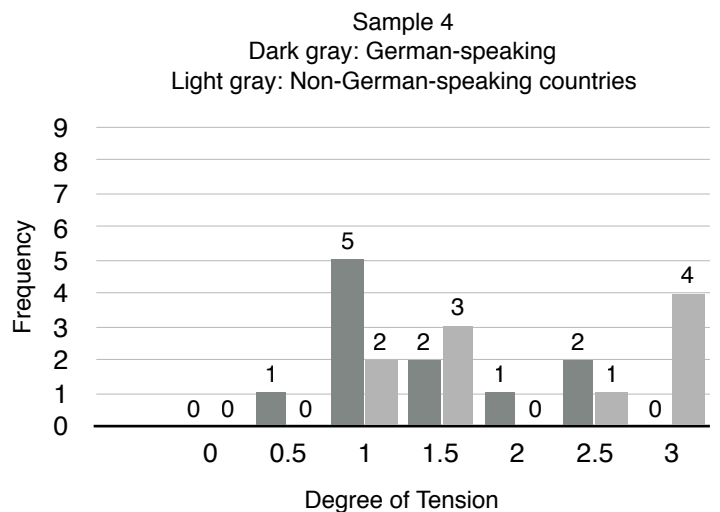
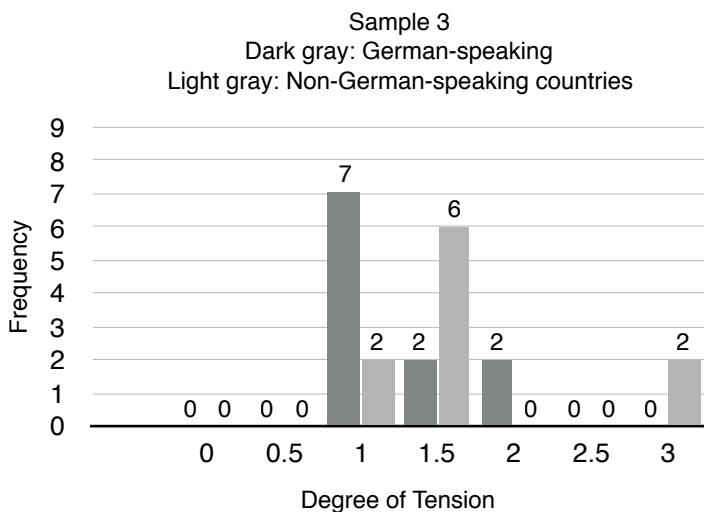
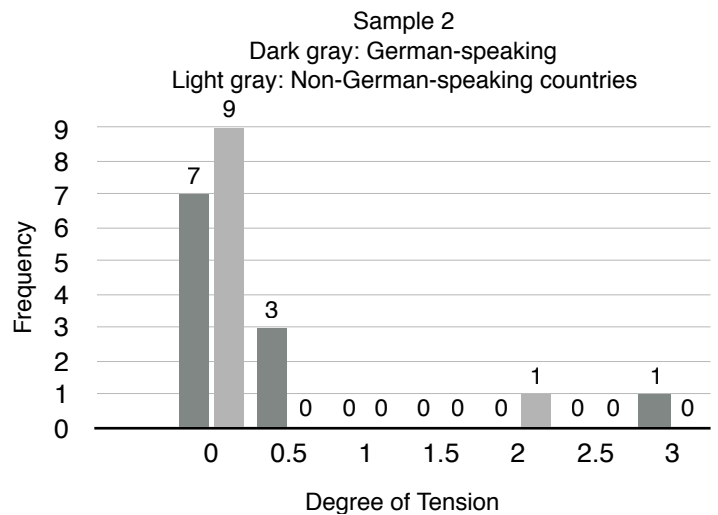
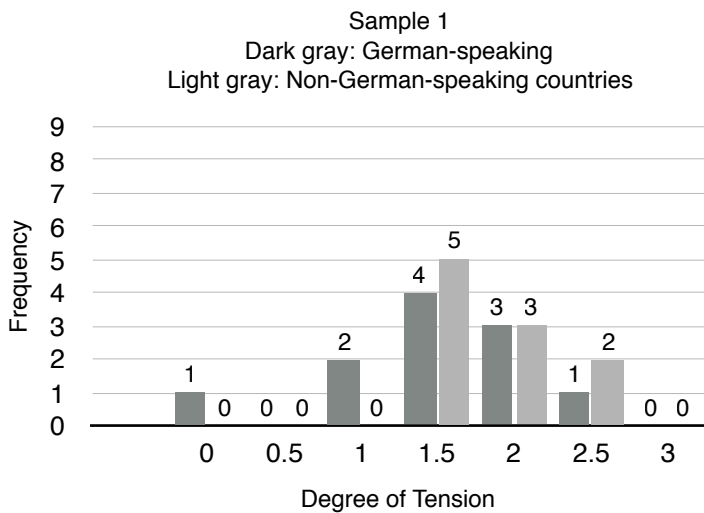
To analysis this, first of all the frequency distribution for all participants regarding the degree of tension has been evaluated. The results can be seen in the following tables (left) and graphs (below) per handwriting sample. Handwriting sample 1, 2 and 3 show a higher agreement than sample 4.



In a second step the participant results were divided into two groups: 11 participants in the group of the German-speaking countries and 10 participants in the group of the non-German-speaking countries. The results can be seen in the following two tables and graphs (below) per handwriting sample. Handwriting sample 1 and 2 show a higher agreement than sample 3 and 4.

Frequency (German-speaking countries)				
Tension	Sample 1	Sample 2	Sample 3	Sample 4
0	1	7	0	0
0.5	0	3	0	1
1	2	0	7	5
1.5	4	0	2	2
2	3	0	2	1
2.5	1	0	0	2
3	0	1	0	0

Frequency (Non-German-speaking countries)				
Tension	Sample 1	Sample 2	Sample 3	Sample 4
0	0	9	0	0
0.5	0	0	0	0
1	0	0	2	2
1.5	5	0	6	3
2	3	1	0	0
2.5	2	0	0	1
3	0	0	2	4



In a third step it was interesting to know if the difference between German-speaking and non-German-speaking countries is significant. Therefore the Mann-Whitney-test was performed with the two different groups testing the same sample (four in total). The Mann-Whitney-test can be used to compare the central trend of two independent samples. It is a non-parametric test and does not require normal distribution. At a conventional significance level  $< 0.05$  the critical value for each sample tested by two different groups (size 11 and 10) is 31. For assessing a significant difference between German- and non-German-speaking groups the result of Mann-Whitney-test per sample has to be smaller than 31. The results are as follows:

Sample 1	44.5
Sample 2	41.5
Sample 3	29.0
Sample 4	30.0

For sample 3 and 4 the differences are significant. Going back to the histograms of sample 3 and 4 it is obvious that in sample 3 and 4 German-speaking countries were more frequently analyzing a lower degree of tension than non-German-speaking countries.

### 3. Conclusions of Interlab Proficiency Test No. 002

- In handwriting sample 1, 2, 3 there is a good agreement regarding the degree of tension over all participants. In all three handwritings it was rather easy to determine a dominant degree of tension.
- In handwriting sample 4 however it was not easy to determine a dominant degree of tension. According to the founder of this handwriting sign, Dr. Rudolf Pophal, most of the handwritings are belonging to different kinds of degrees of tension. This is the case in handwriting sample 4. Going back to the raw values of handwriting no. 4 it can be seen that the majority of the participants determined both a medium and high degree of tension.
- In handwriting no. 2 on the other hand the majority agreed on a „lack of tension“ apart from some outliers who would weigh little if the number of participants had been higher.