

# The Panel Check

- a graphical tool for performance evaluation of sensory panels

**Asgeir Nilsen - Matforsk**

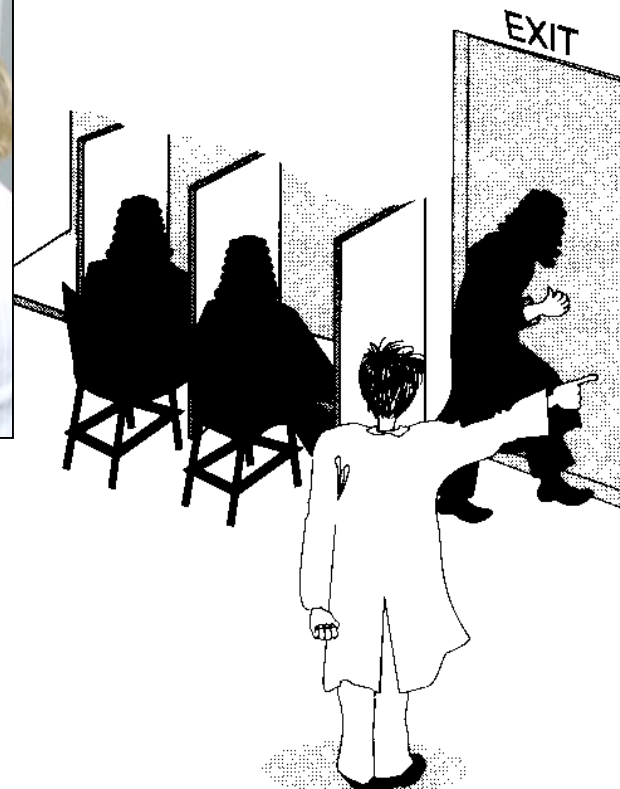
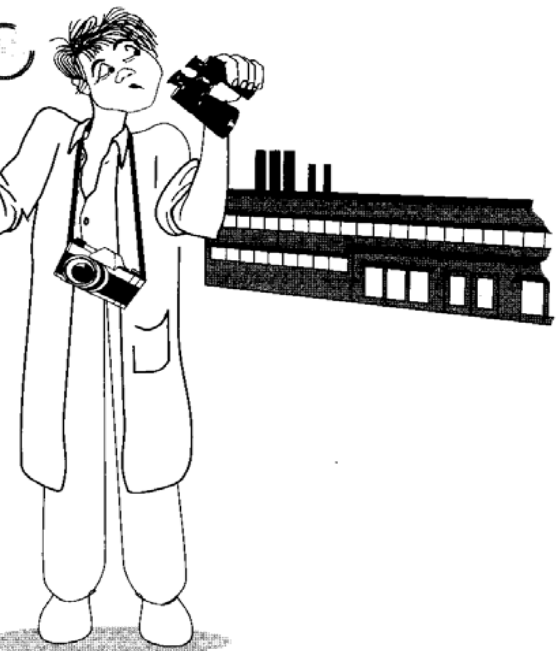
**7<sup>th</sup> SENSOMETRICS CONFERENCE - UC DAVIS 2004**

Oliver Tomic, Magni Martens, Harald Martens, Tormod Næs  
Matforsk (Norwegian Food Research Institute), Ås, Norway

- Why perform panel monitoring ?
- What is the **Panel Check**?
- Some plots in today`s version of **Panel Check**
- Example from descriptive analysis of peas
- Ideas for a new version of **Panel Check**

# Why perform panel monitoring?

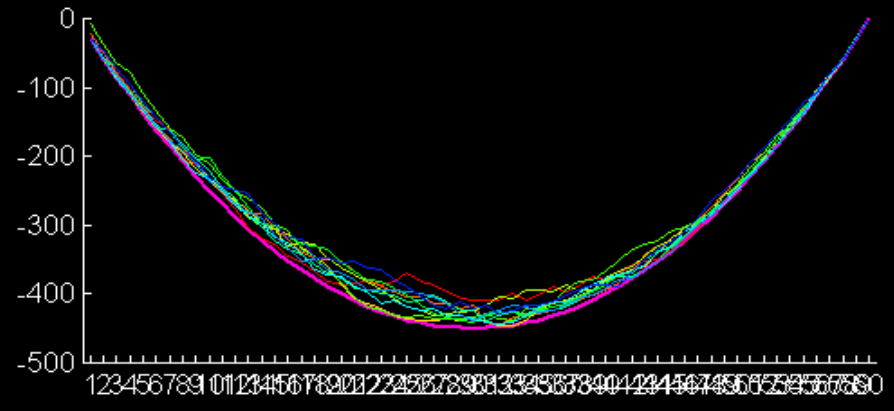
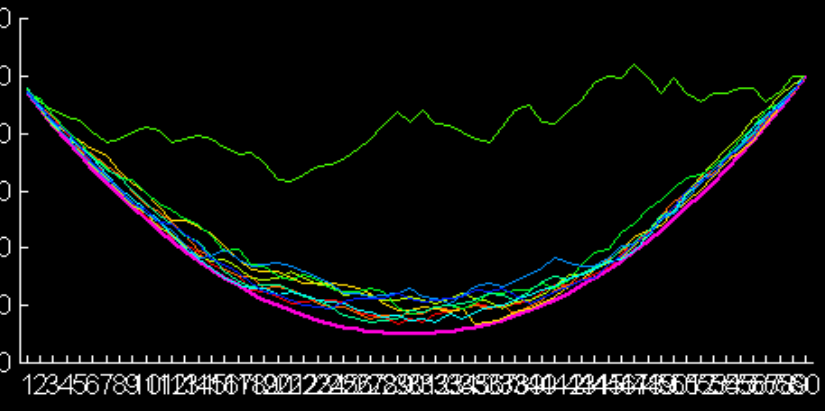
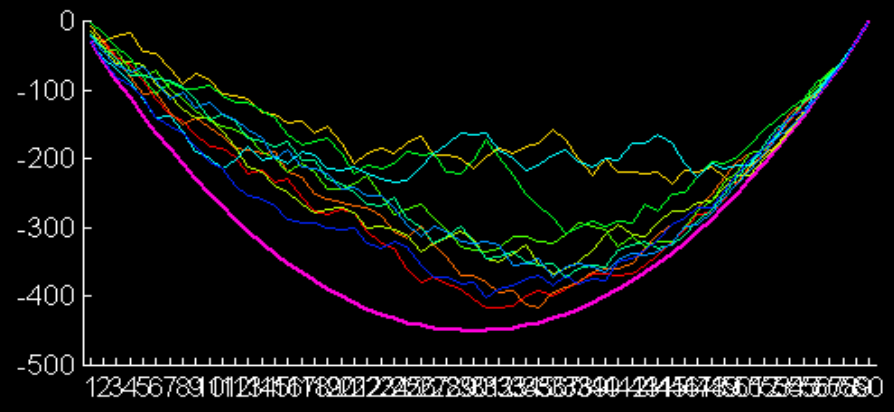
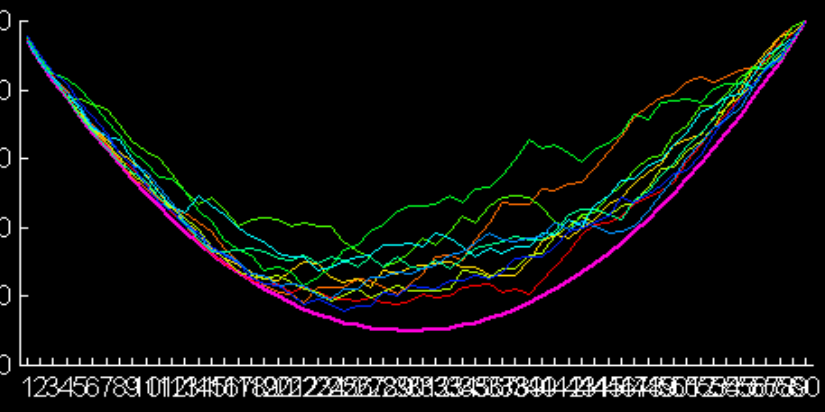
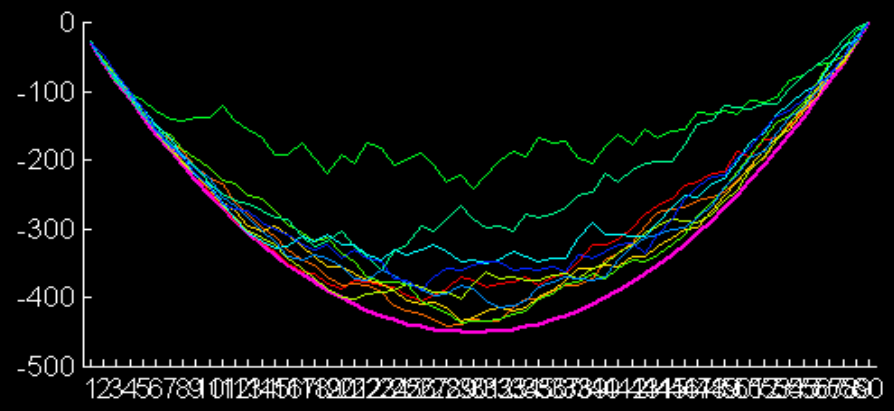
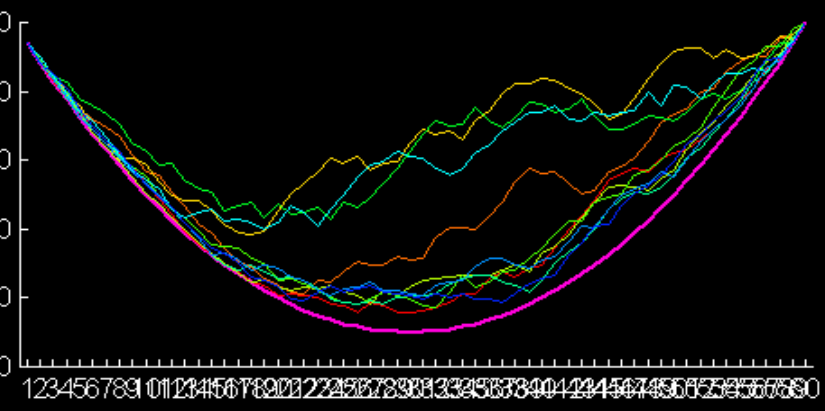
MATFORSK



- Some good techniques exist
  - different methods for different practical situations
- No user-friendly software exists
- A suitable program for panel monitoring:
  - based on graphical techniques
  - easy interpretation of the results
- Need for co-ordination of this knowledge and implementation in a user-friendly program for the industry

- Aim: graphical tool for panel leaders in training and monitoring of sensory panels
- Today`s Panel Check was developed in 1996 and was only used internally
- Descriptive analysis (Descriptive test and Quality control)
- Works with Matlab 4
- To interpret results little statistical knowledge is needed (easy to use)
  
- Statistics are based on one-way ANOVA for each (assessor x attribute) and ranking
- Assumptions:
  - The replicates are assumed to be homogeneous (same batch)
  - More than 1 replicate is required to produce certain plots

Dommer 7's rangering av mealiness for sort 1 til 60, midlet over gjentak 1 og 2.



Ny figurseri

Utskrift

Kast album

Forstør

Lukk album

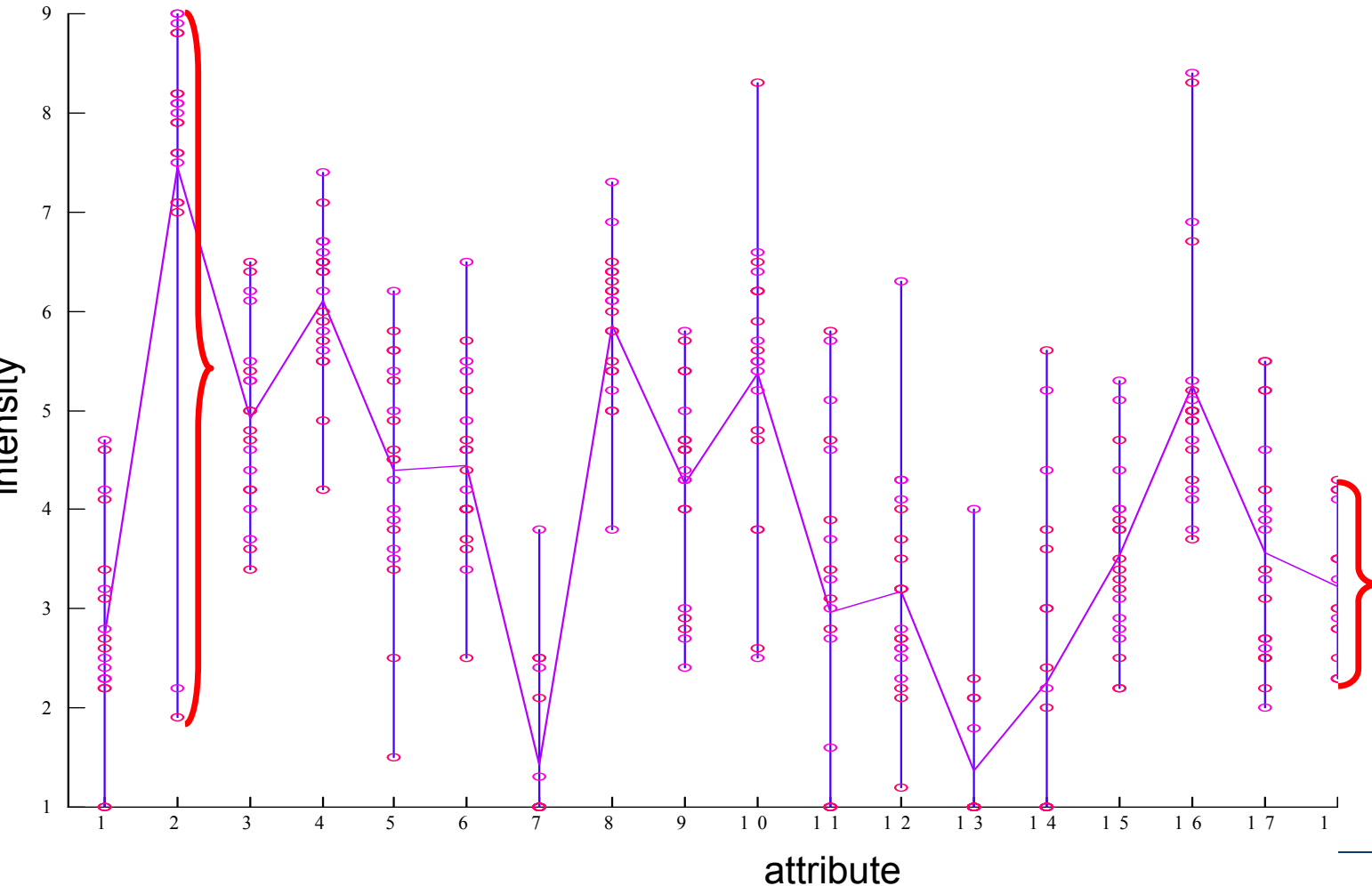
Avslutt

Hjelp

# Some plots in Panel Check

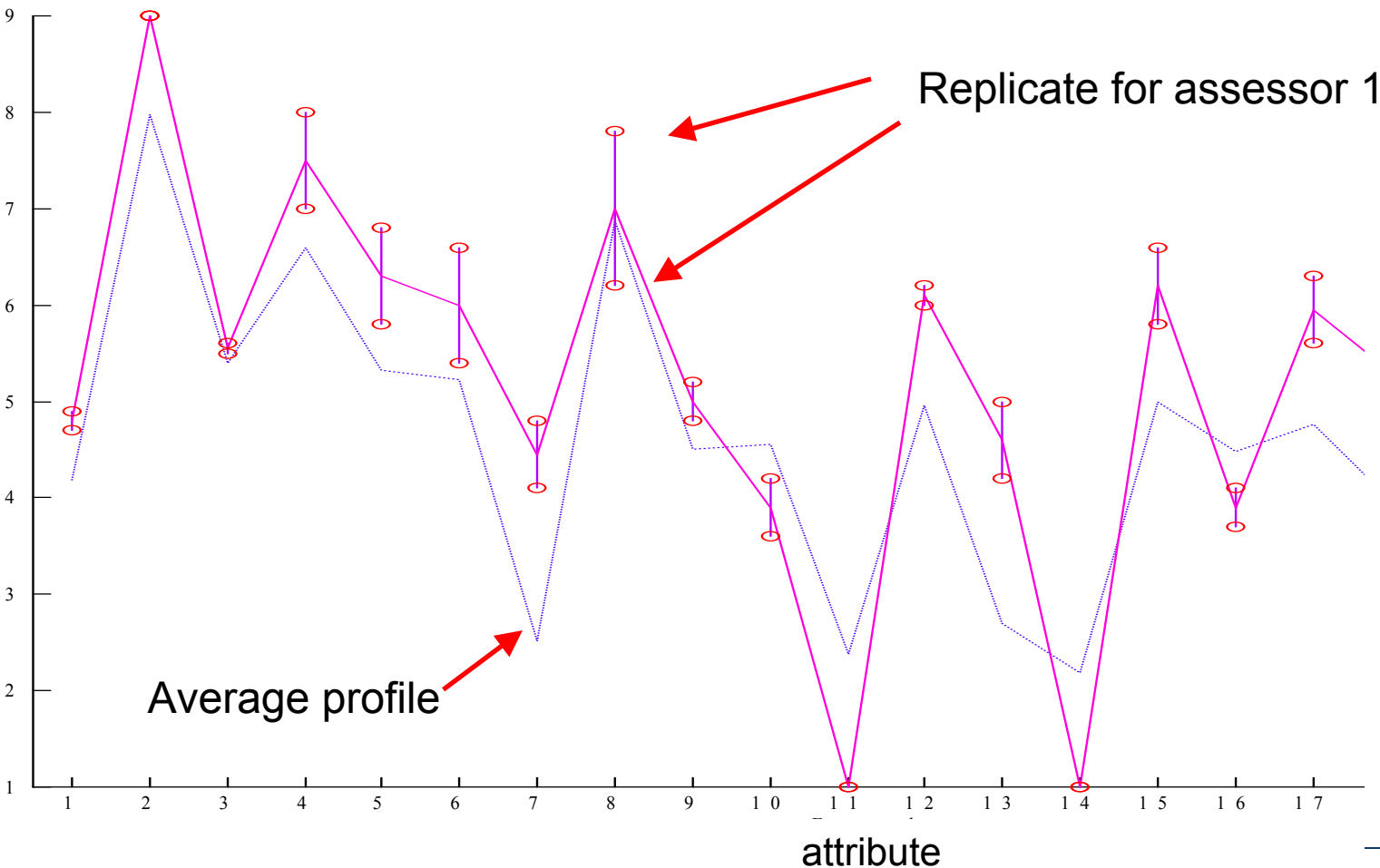
# Sample Profile with Individual Score

- The sample profile line is plotted along with an individual assessors' average profile across all attributes

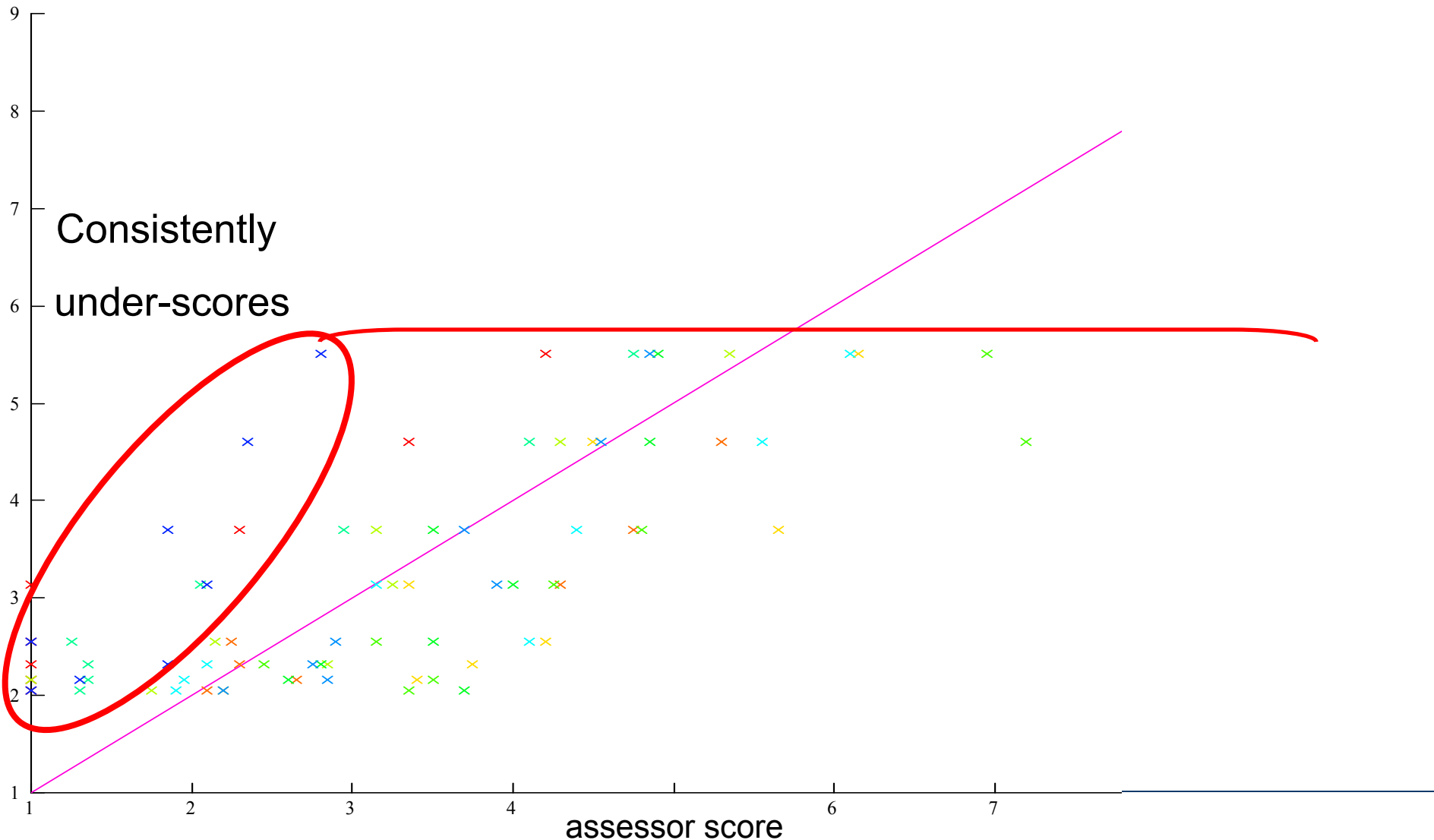


# Individual Averages & Score Values

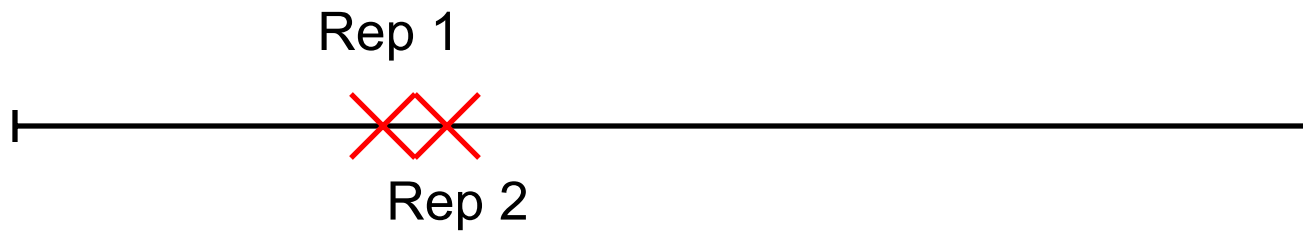
- examines one assessor's performance to the average performance of the panel



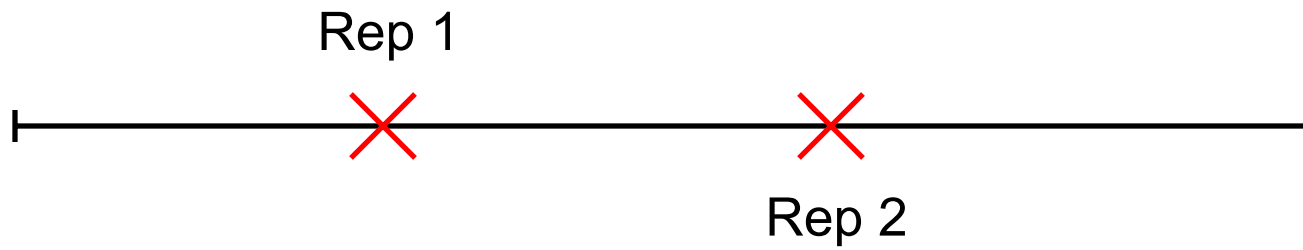
Plots the assessors scores for each sample against the panel mean



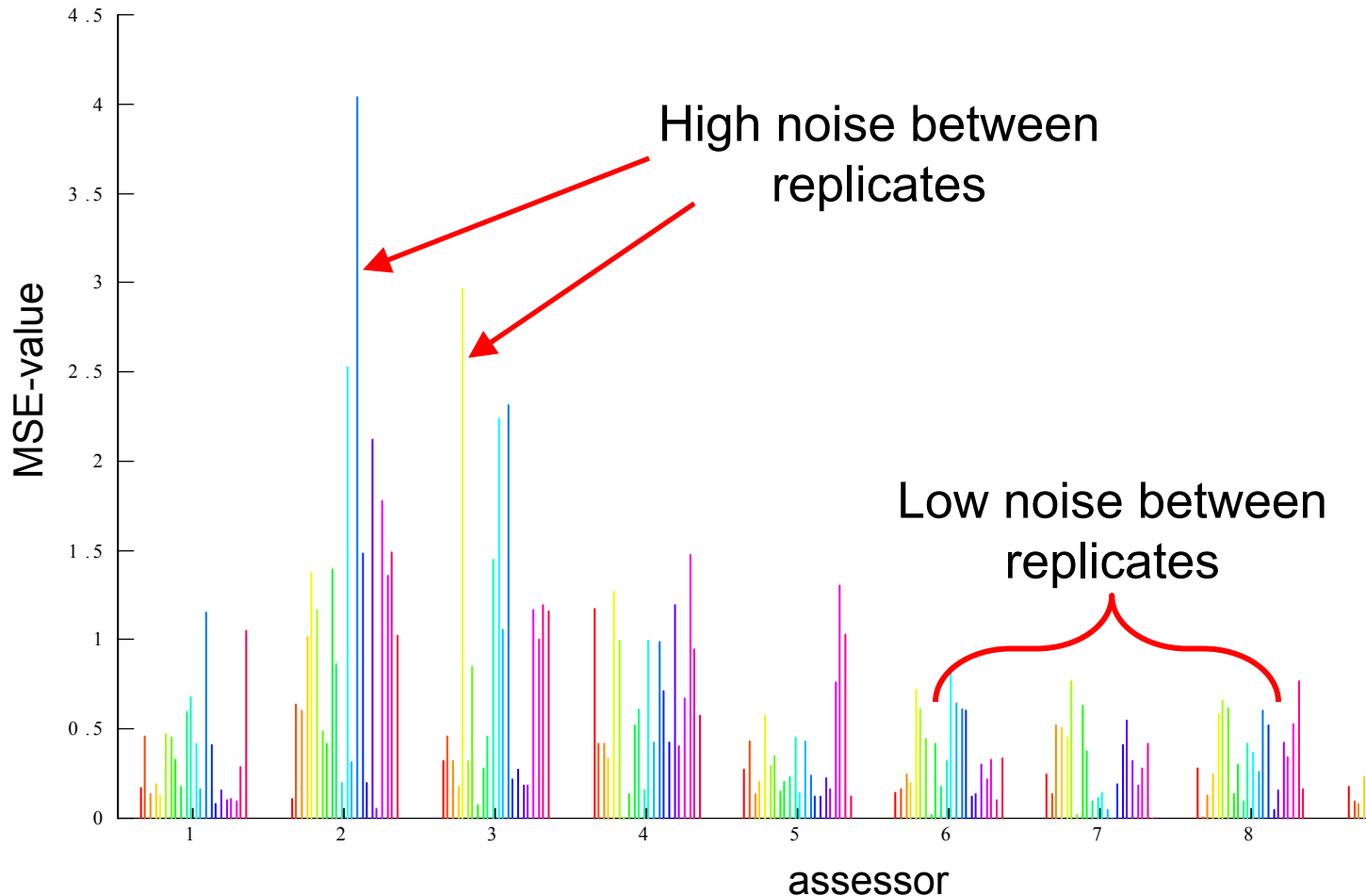
Assessor 1 *Low MSE*



## Assessor 2 *High MSE*

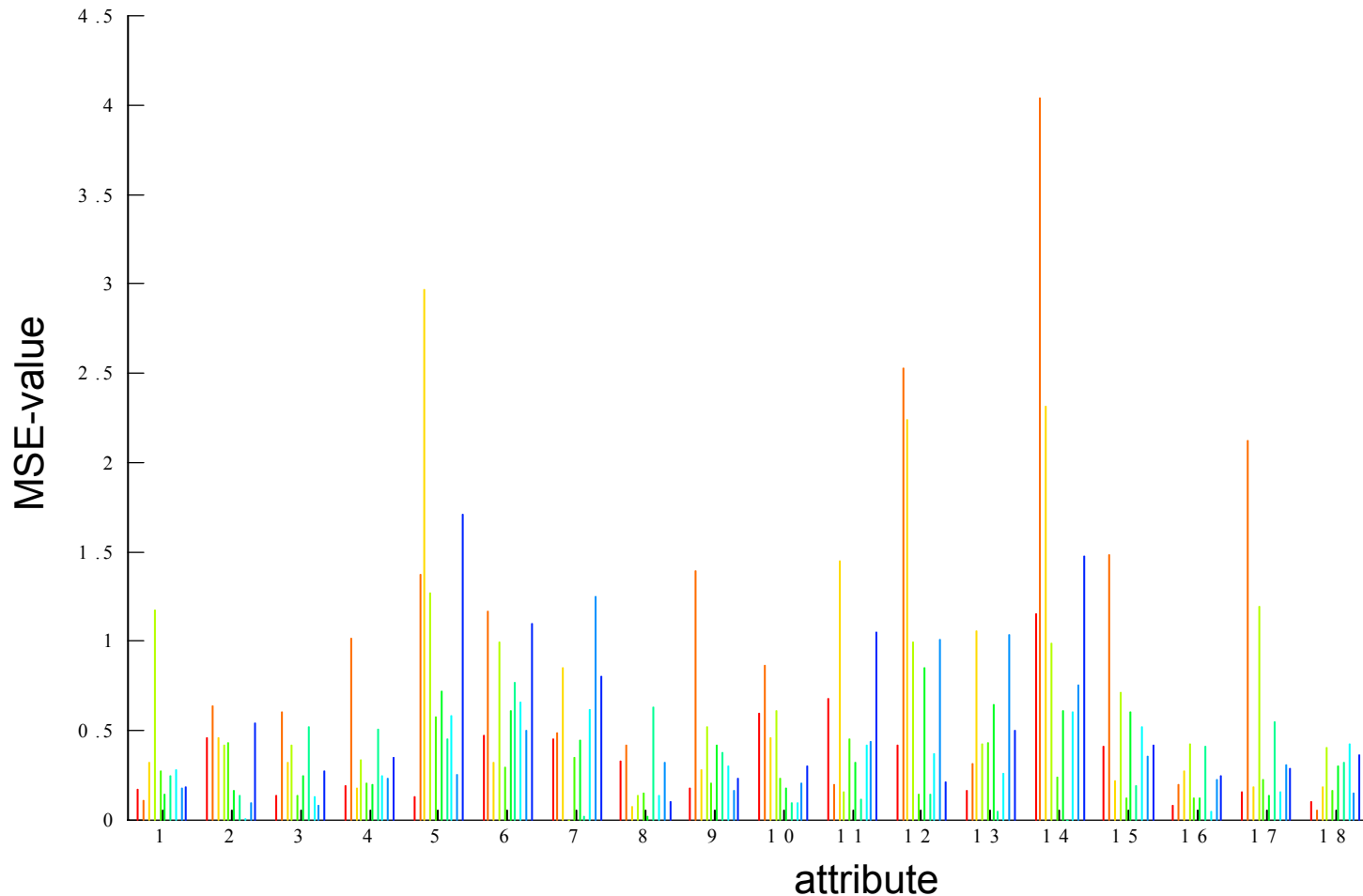


- MSE values are plotted to visualise assessors' ability to reproduce their results for the different attributes



# MSE values grouped by Attribute

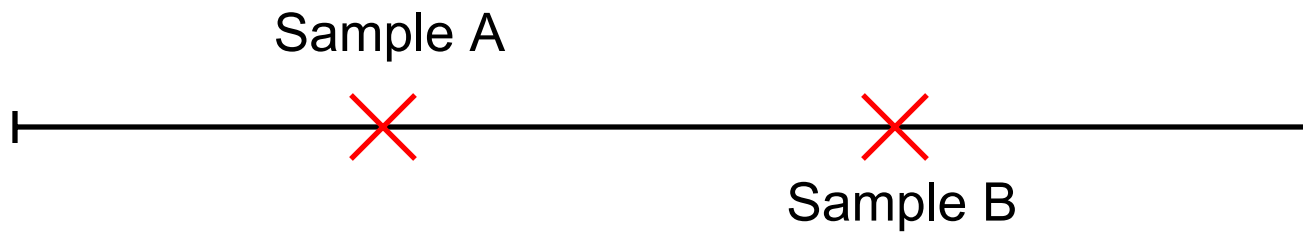
- MSE values for assessors` are plotted and grouped by attribute to compare assessors in their ability to reproduce results across replications



Assessor 1 *Low F-value*

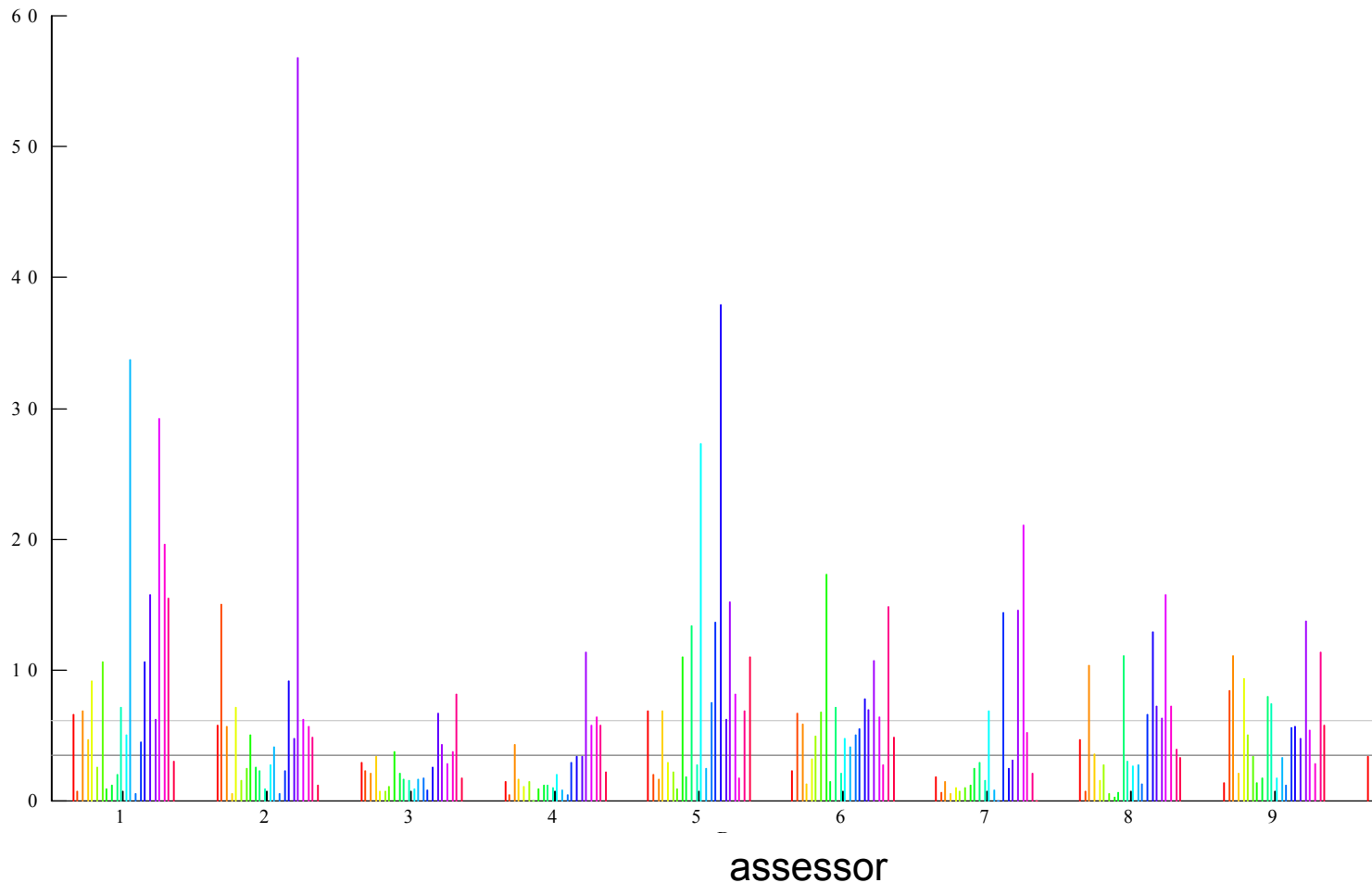


## Assessor 2 *High F-value*



# F values grouped by Assessor

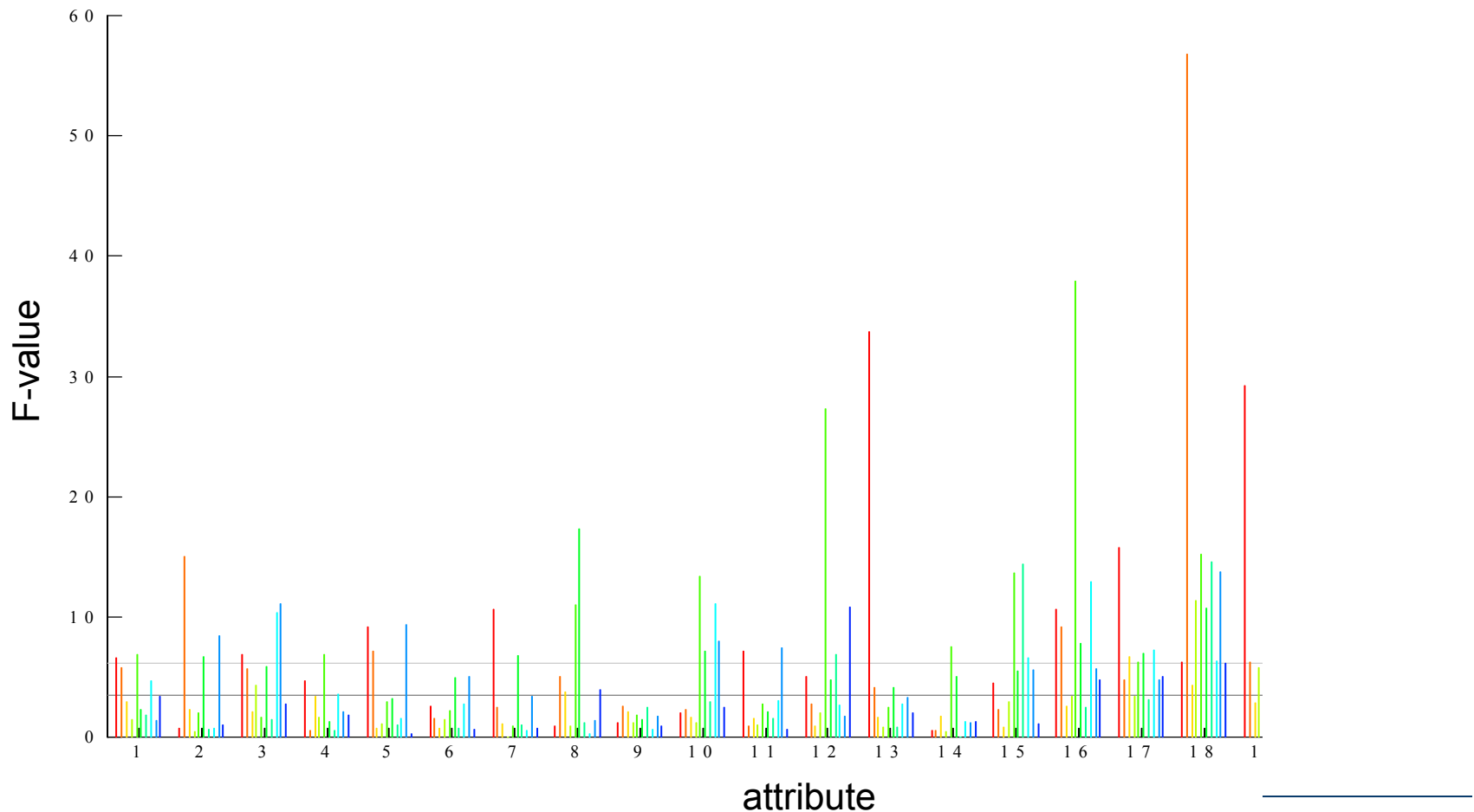
- F values are plotted to visualise assessors' ability to discriminate between samples for the different attributes



1% level  
5% level

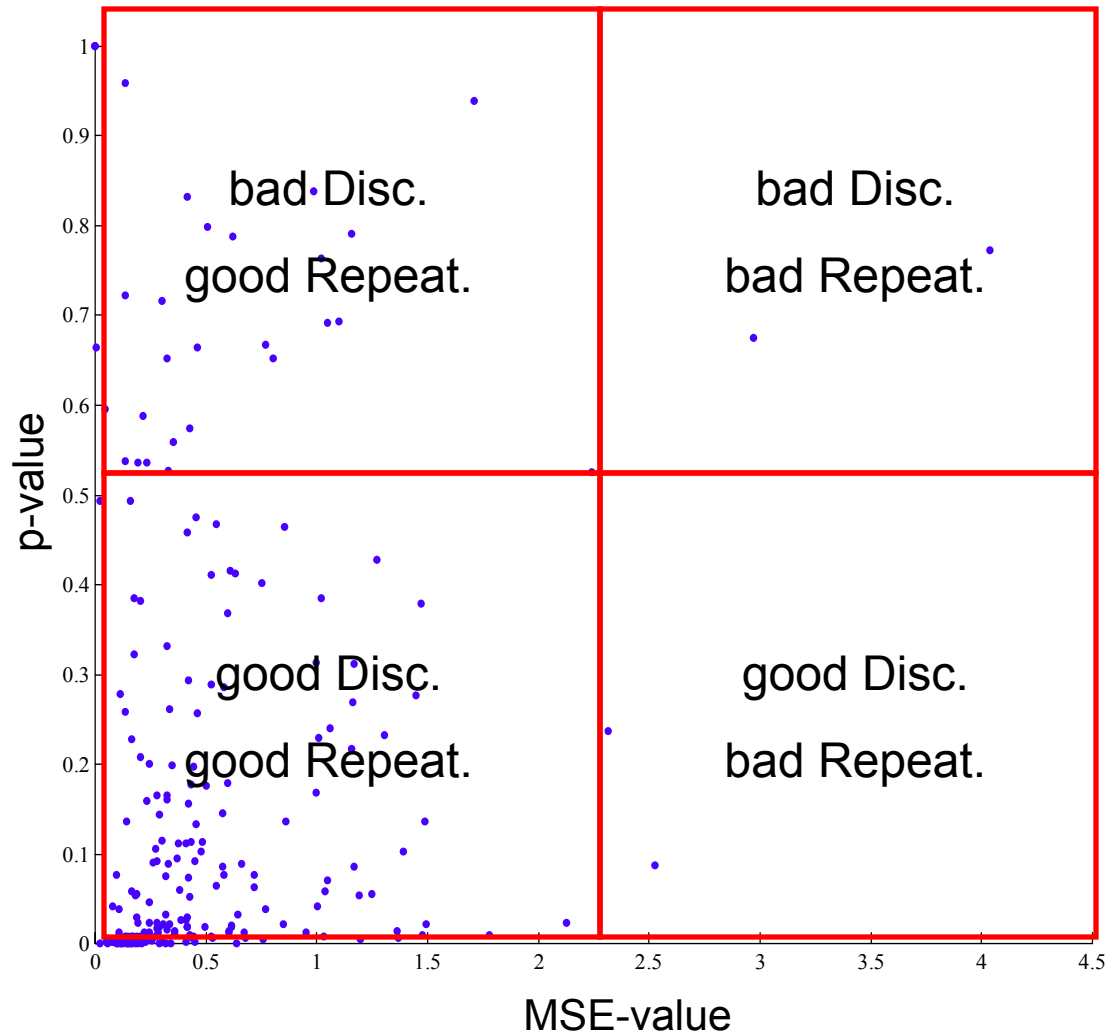
# F values grouped by Attribute

- F values for assessors are plotted and grouped by attribute to compare assessors in their ability to discriminate samples



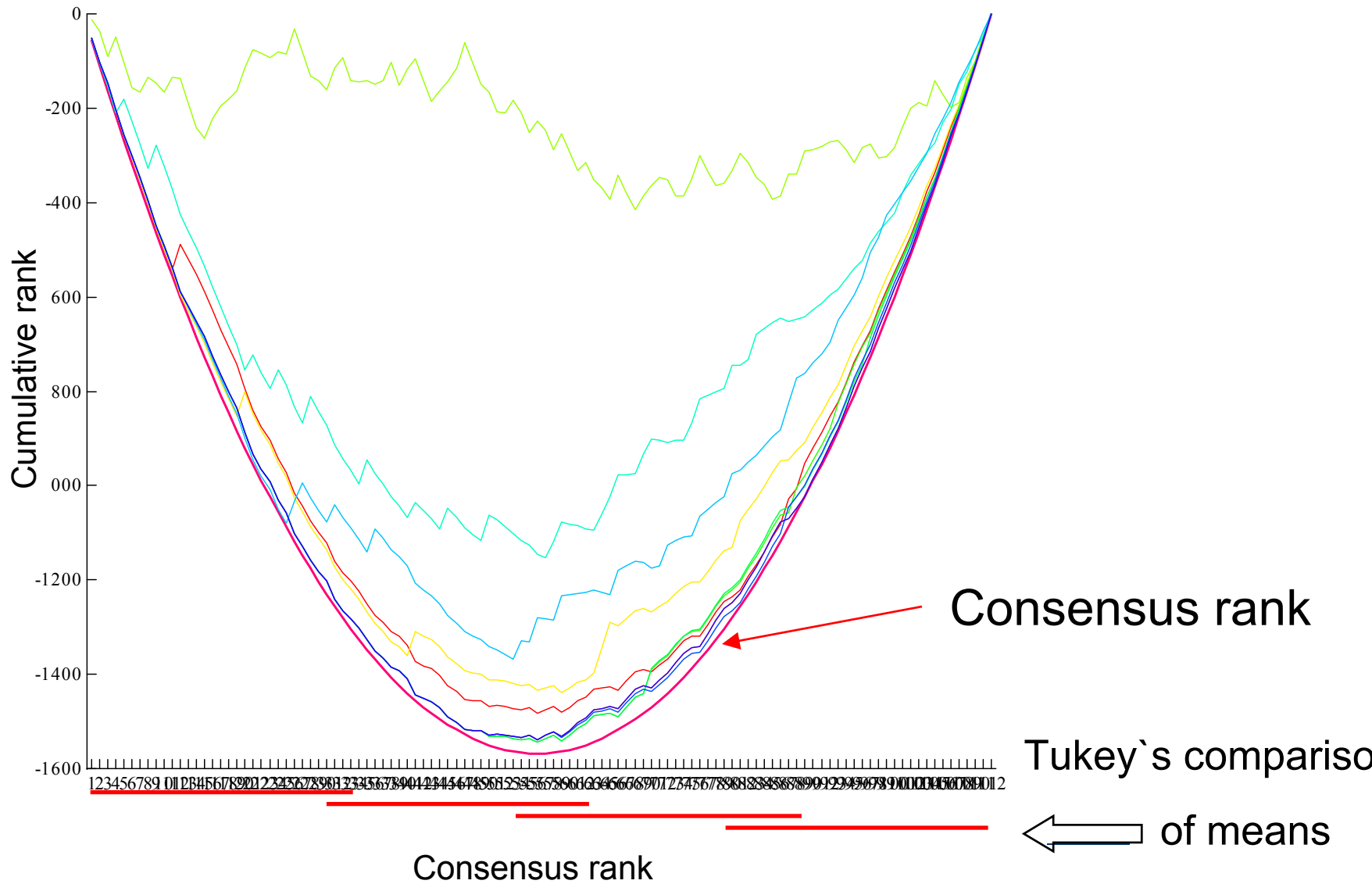
# Discrimination versus Repeatability Plot

- Plots the p-values and the MSE values from the ANOVA for each attribute and each assessor (p\*MSE Plot)



- Plots a consensus ranking of the samples and each assessor's individual ranking results
- More than 6-7 seven samples are recommended
- Use :
  - identify which assessors who have the ability to rank consistently across all samples

# Eggshell Plot

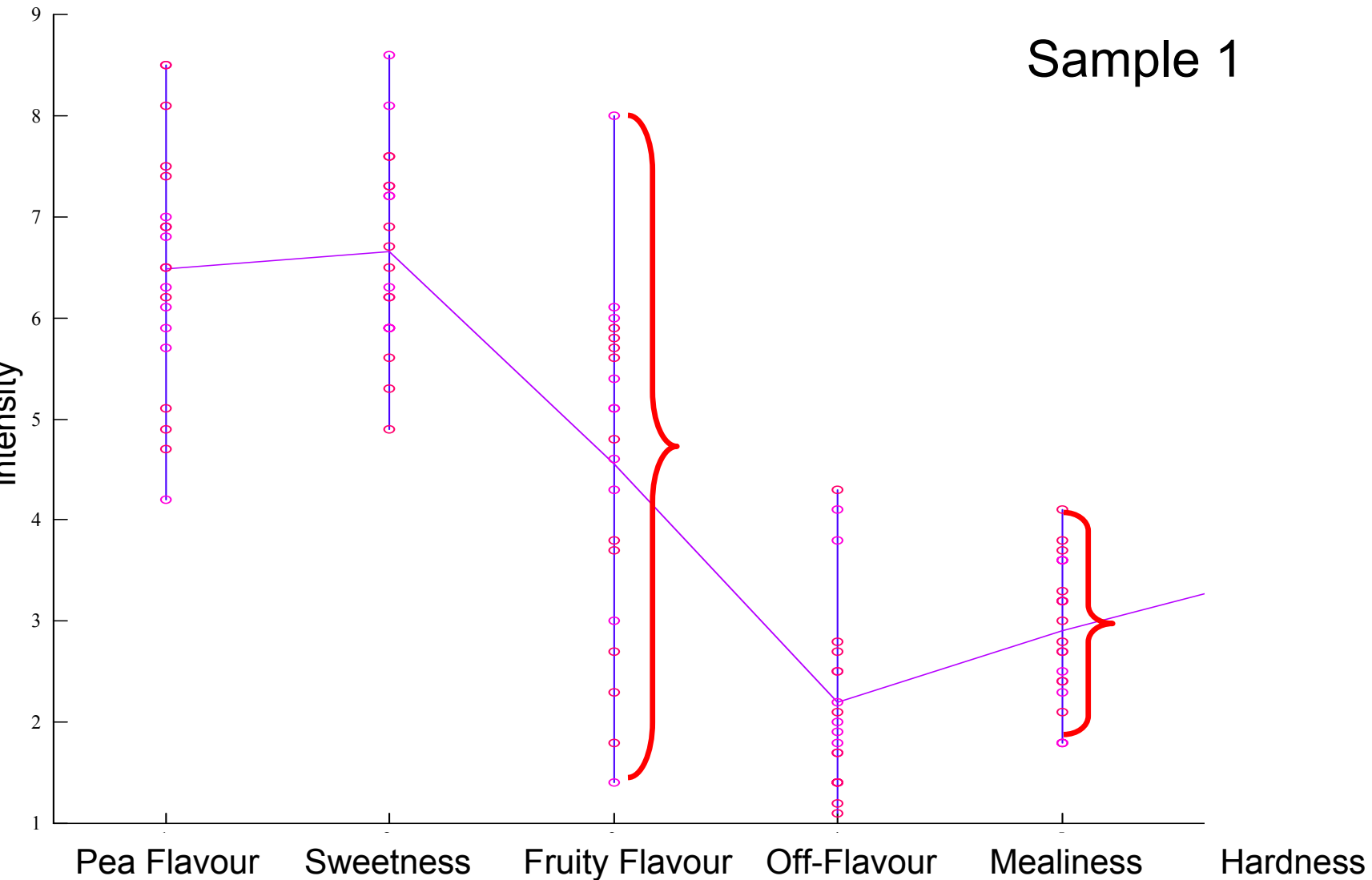


- 27 varieties of peas with different degree of maturity, total of 60 samples
- Six attributes: Pea Flavour, Sweetness, Fruity Flavour, Off- Flavour, Mealiness and Hardness were evaluated on a intensity scale between 1 (low) and 9 (high)
- Two replicates for each assessor, 12 assessors
  
- This dataset will be presented in a Special Issue of Journal of Chemometrics
  - 2 assessors were left out because of missing values in the sensory evaluation

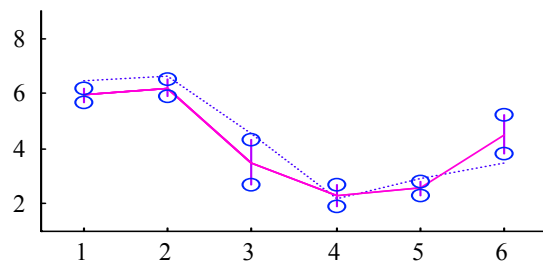
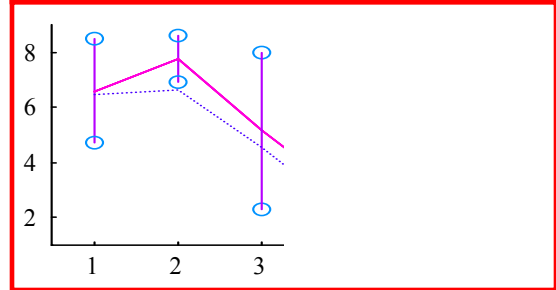
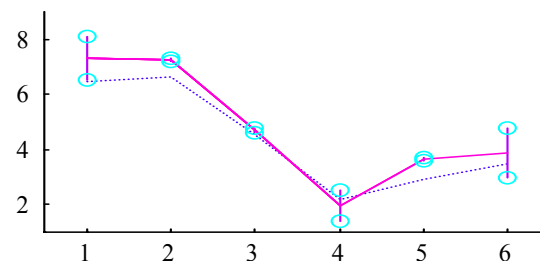
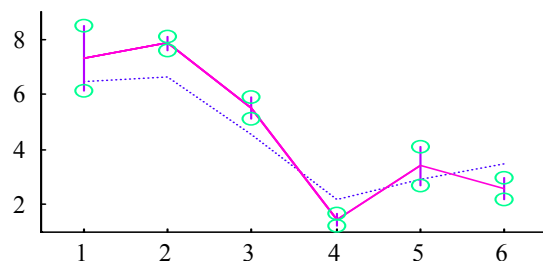
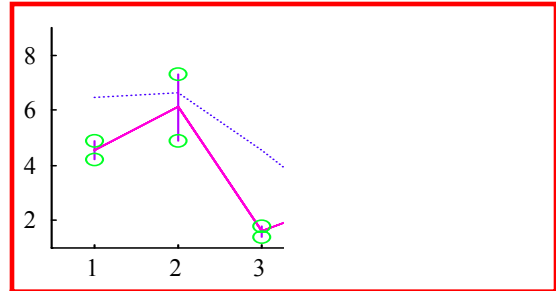
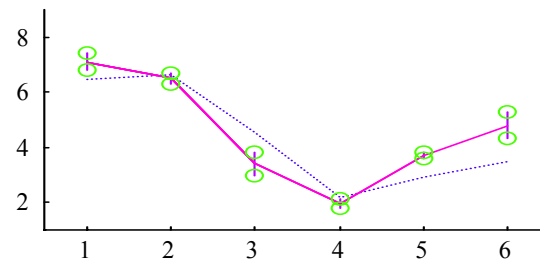
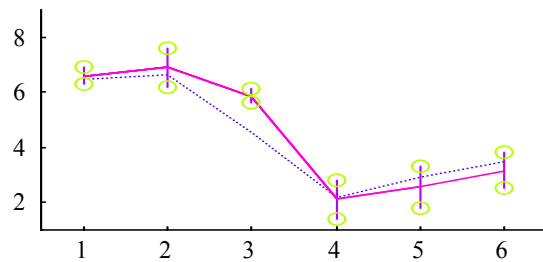
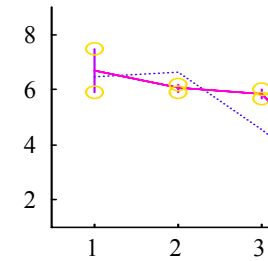
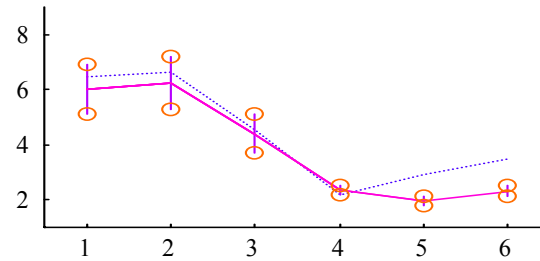
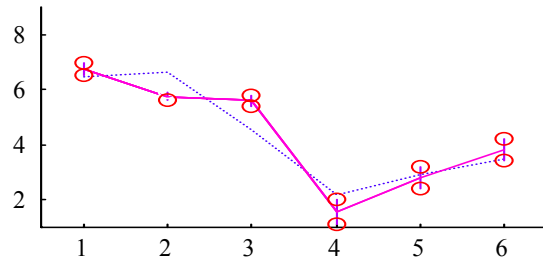
- Design of sensory laboratory, selection and training of assessors according to guidelines in ISO standards
- The experience of the 12 assessors was from 3 to 18 years evaluating a wide range of products



# Sample Profile with Individual Score



# Individual Averages & Score Values



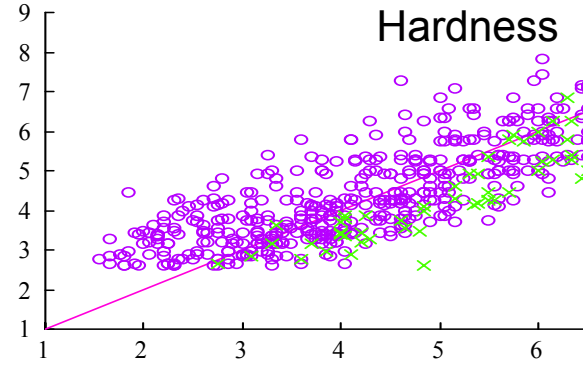
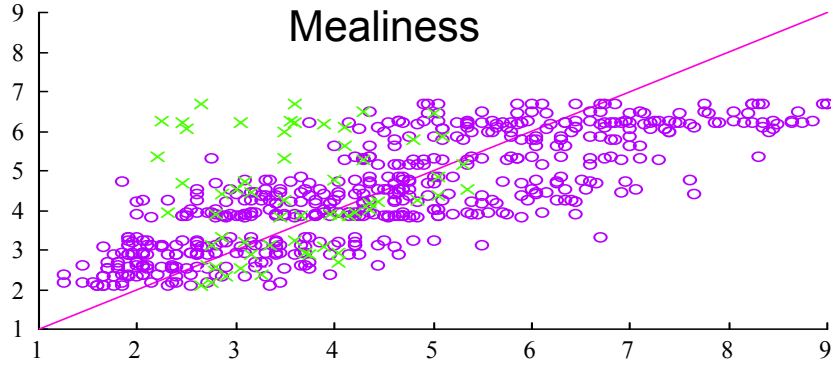
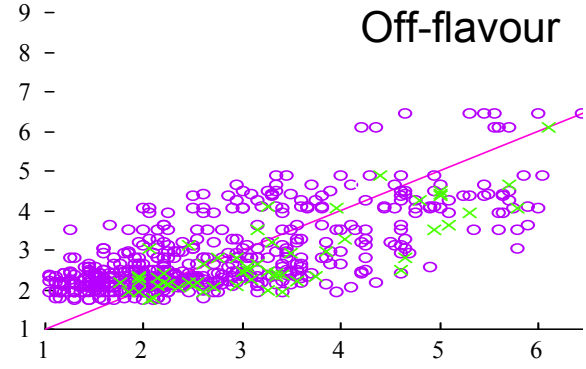
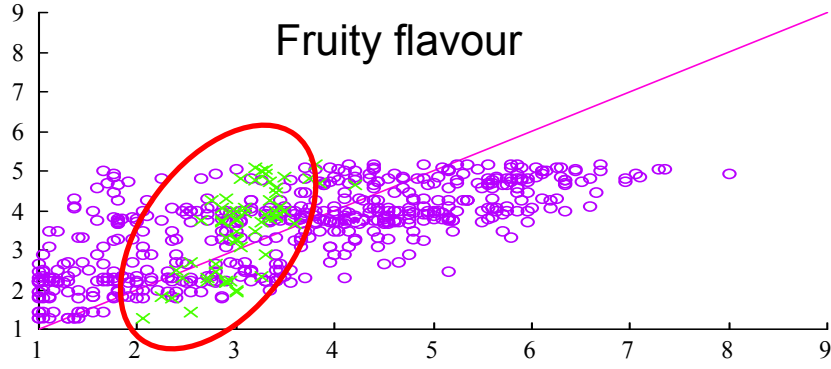
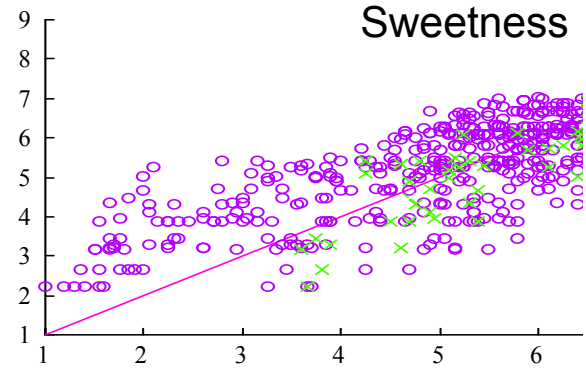
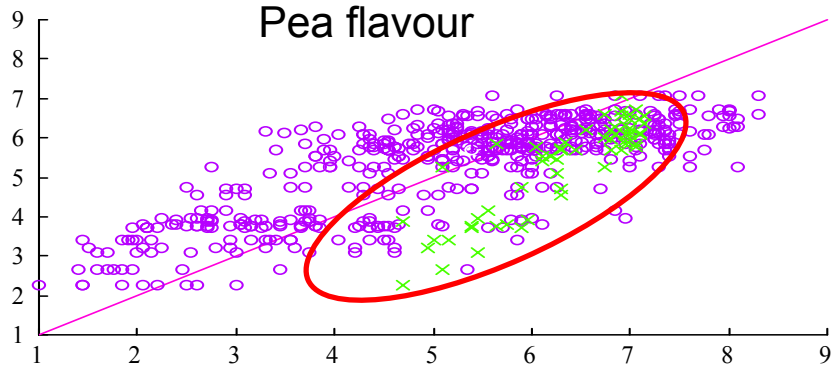
attribute

- 1: Pea Flavour
- 2: Sweetness
- 3: Fruity Flavour
- 4: Off- Flavour
- 5: Mealiness
- 6: Hardness

---: panel mean Sample 1

- : Ass. 3
- : Ass. 4
- : Ass. 5
- : Ass. 6
- : Ass. 7
- : Ass. 8
- : Ass. 9
- : Ass. 10
- : Ass. 11
- : Ass. 12

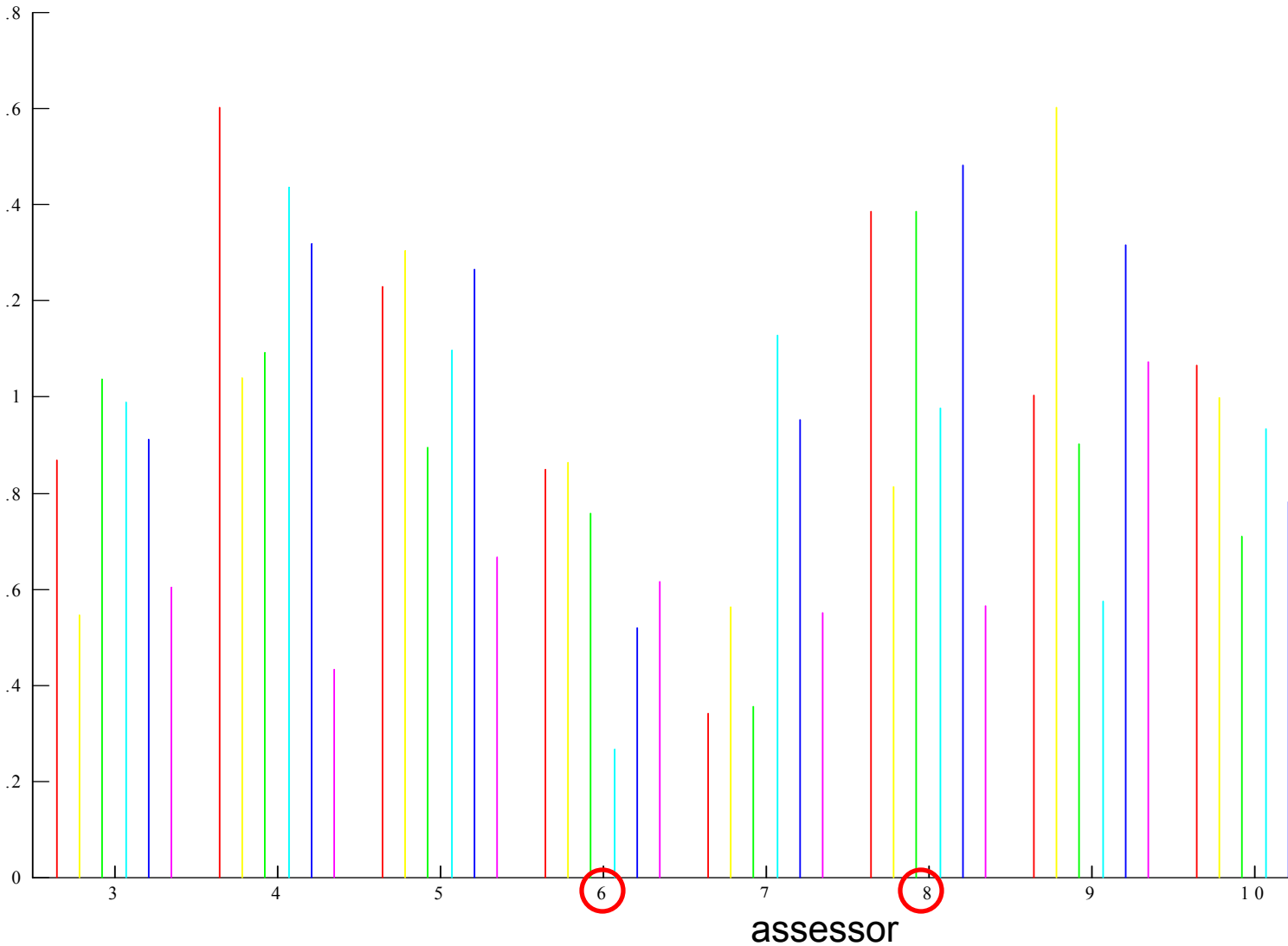
# Correlation Plots (assessor 7)



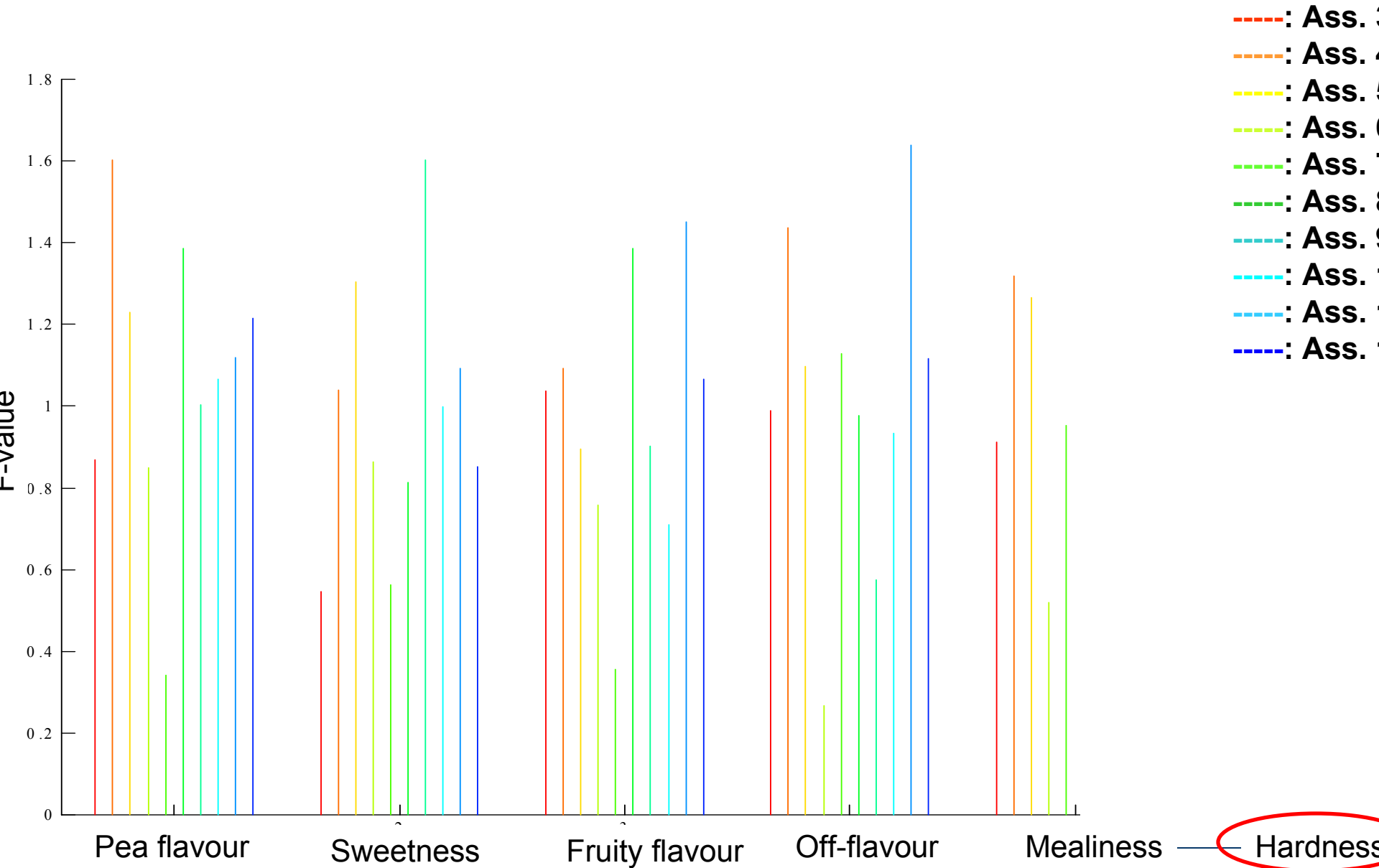
assessor score

# MSE-values sorted after Assessors

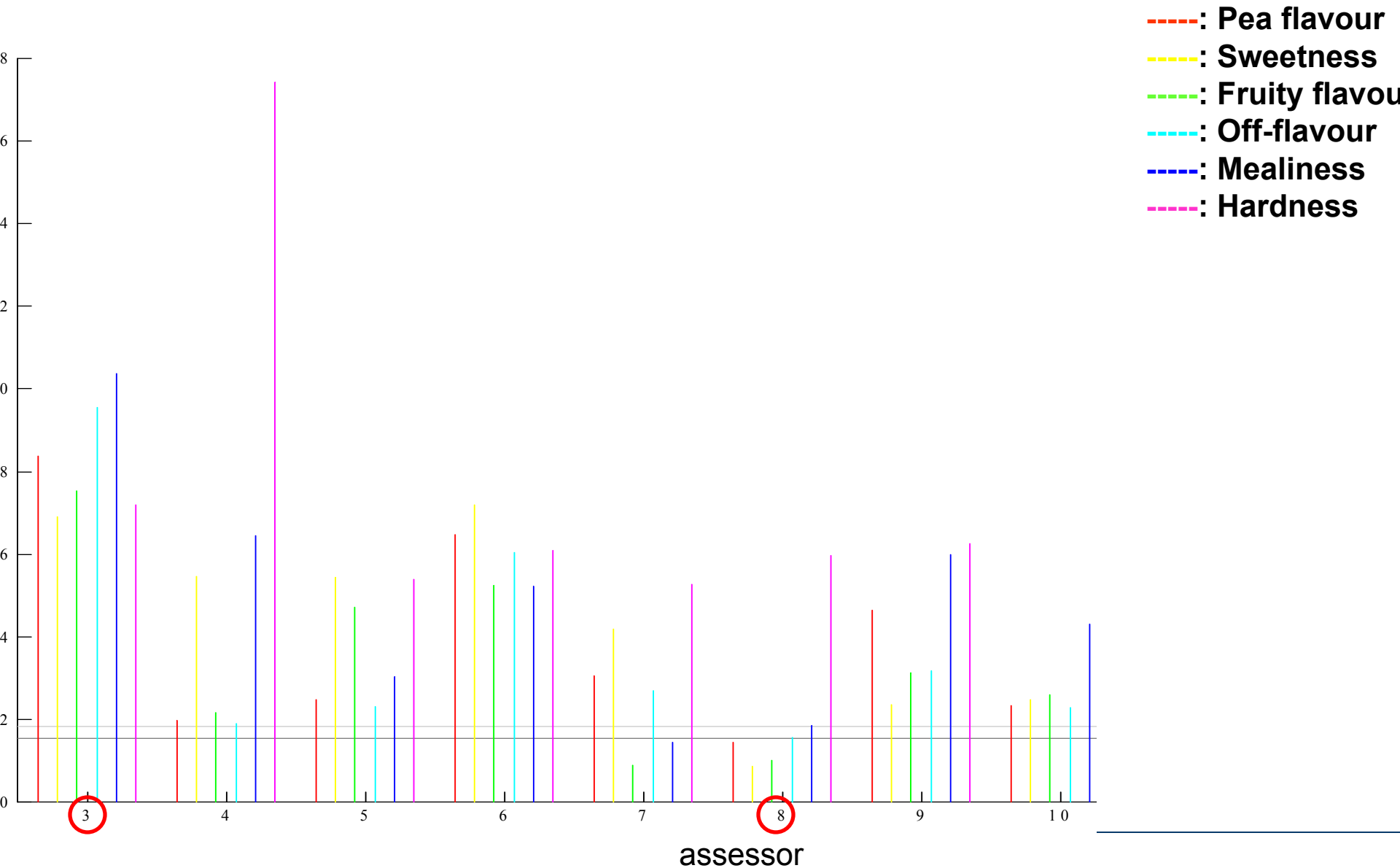
- : Pea flavour
- : Sweetness
- : Fruity flavour
- : Off-flavour
- : Mealiness
- : Hardness



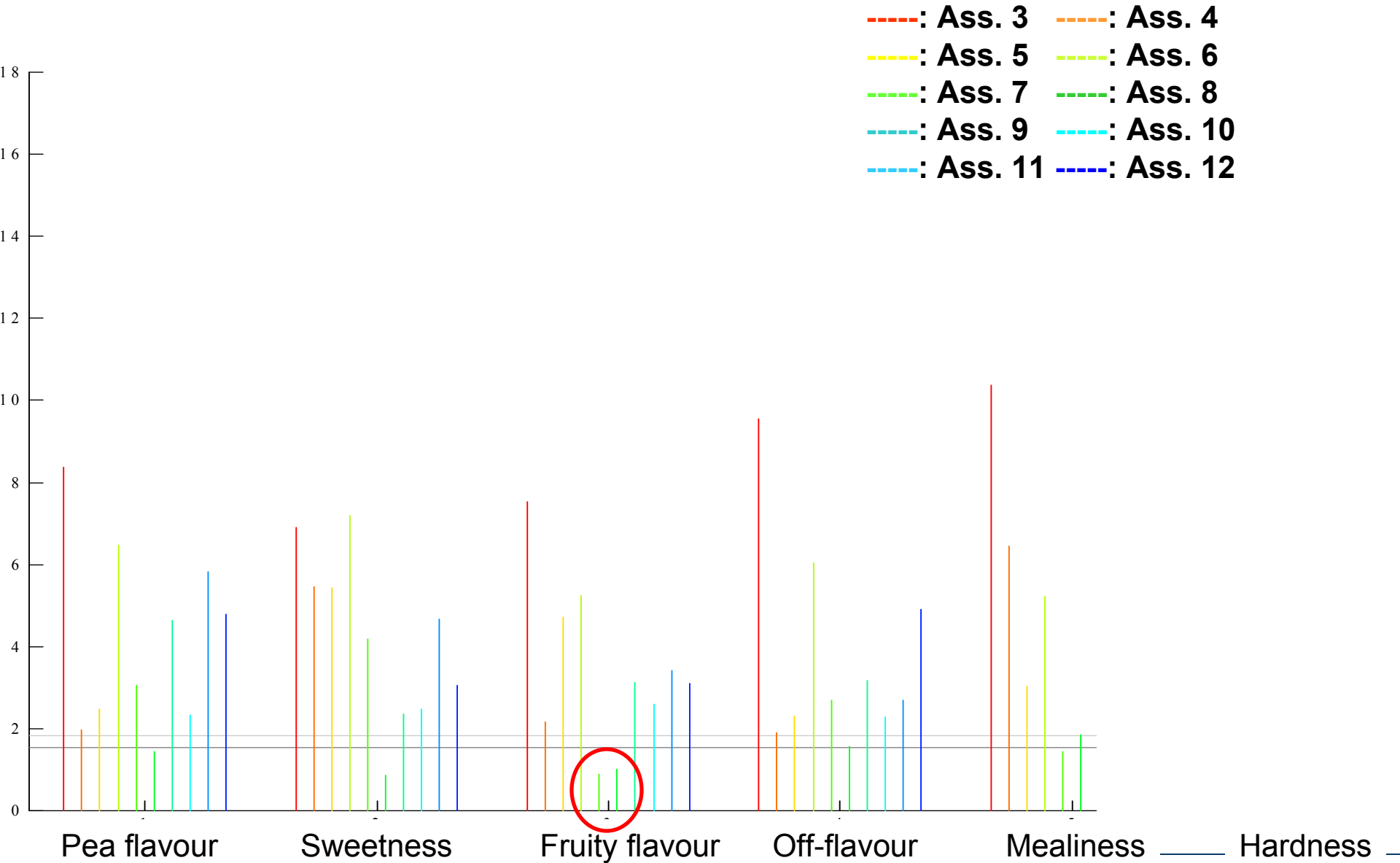
# MSE-values sorted after Attributes

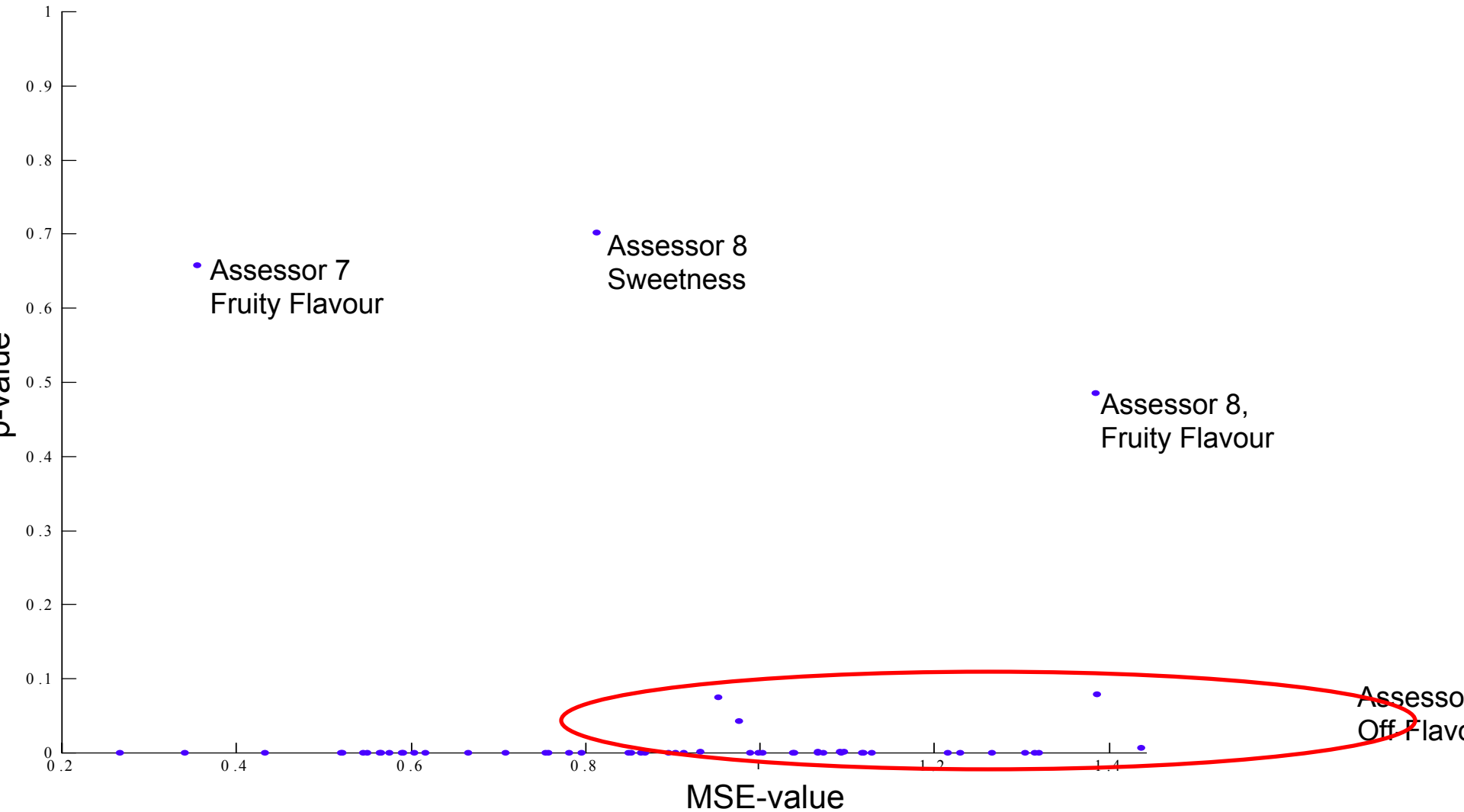


# F-values sorted after Assessors

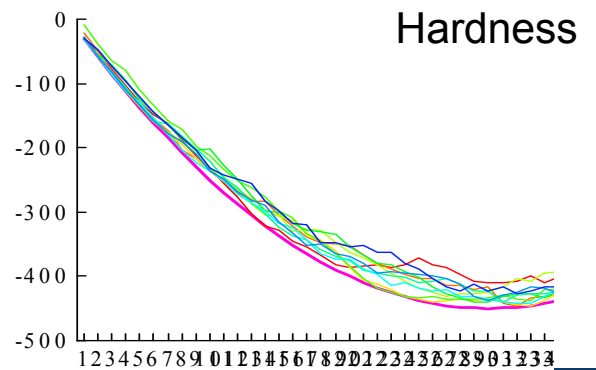
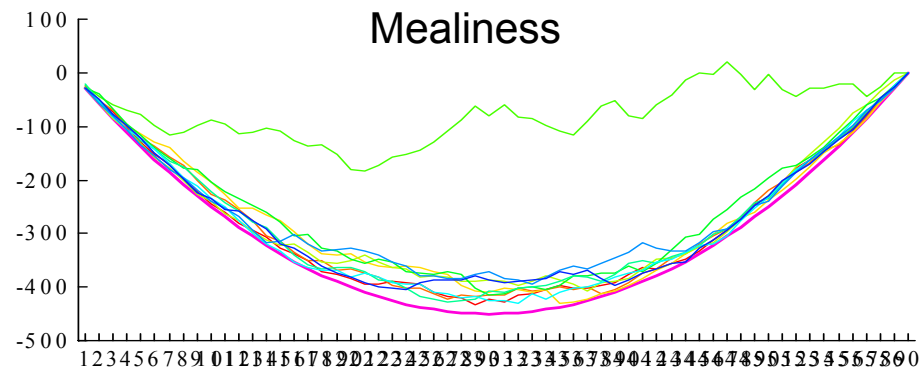
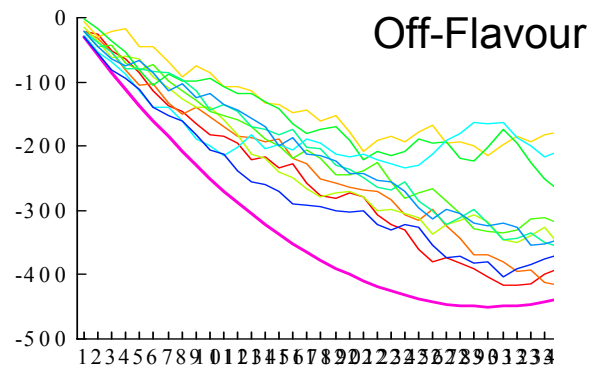
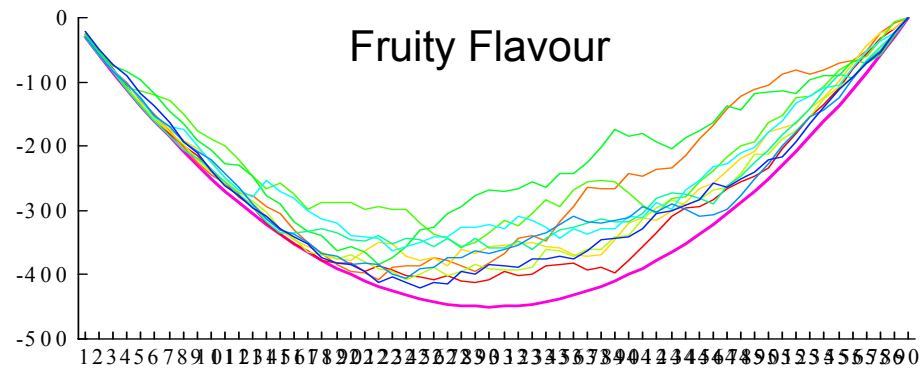
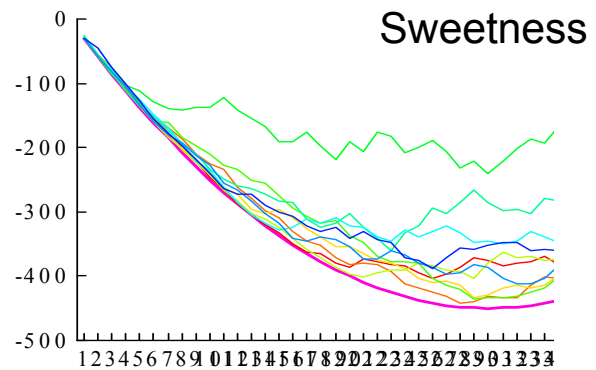
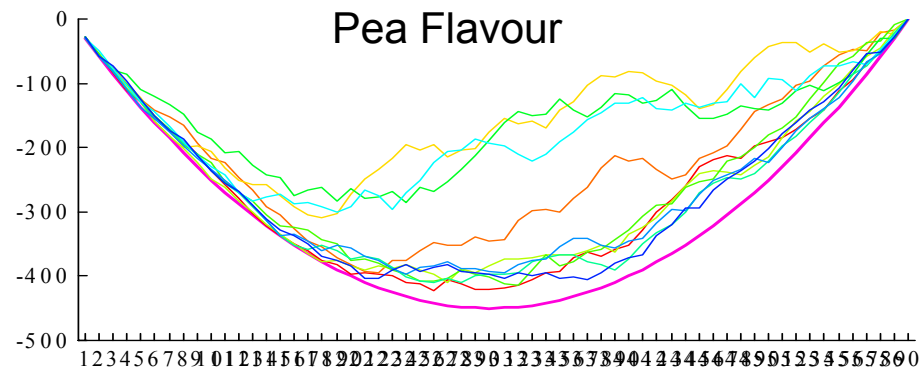


# F-values sorted after Attributes



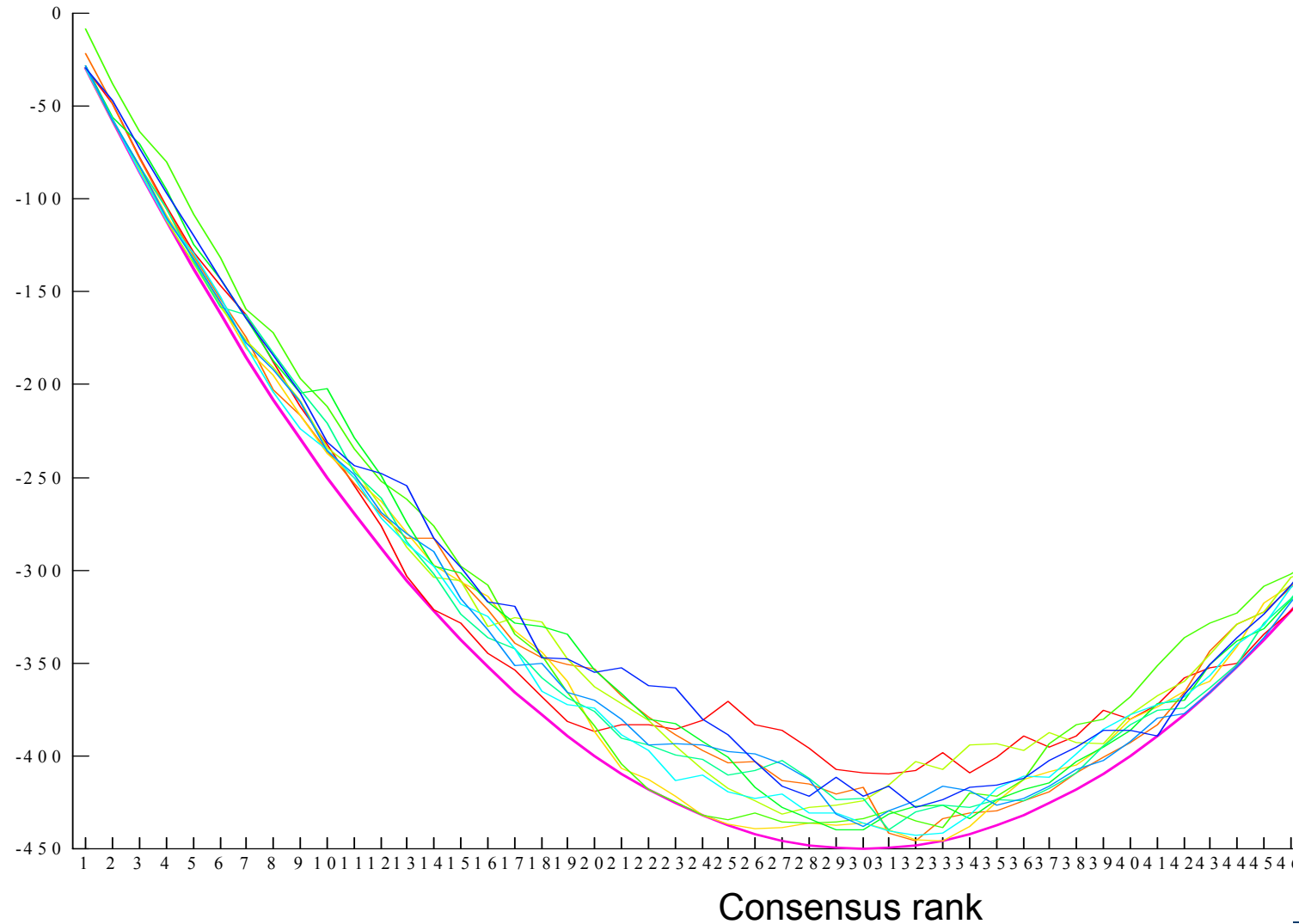


# Eggshell Plots - Peas

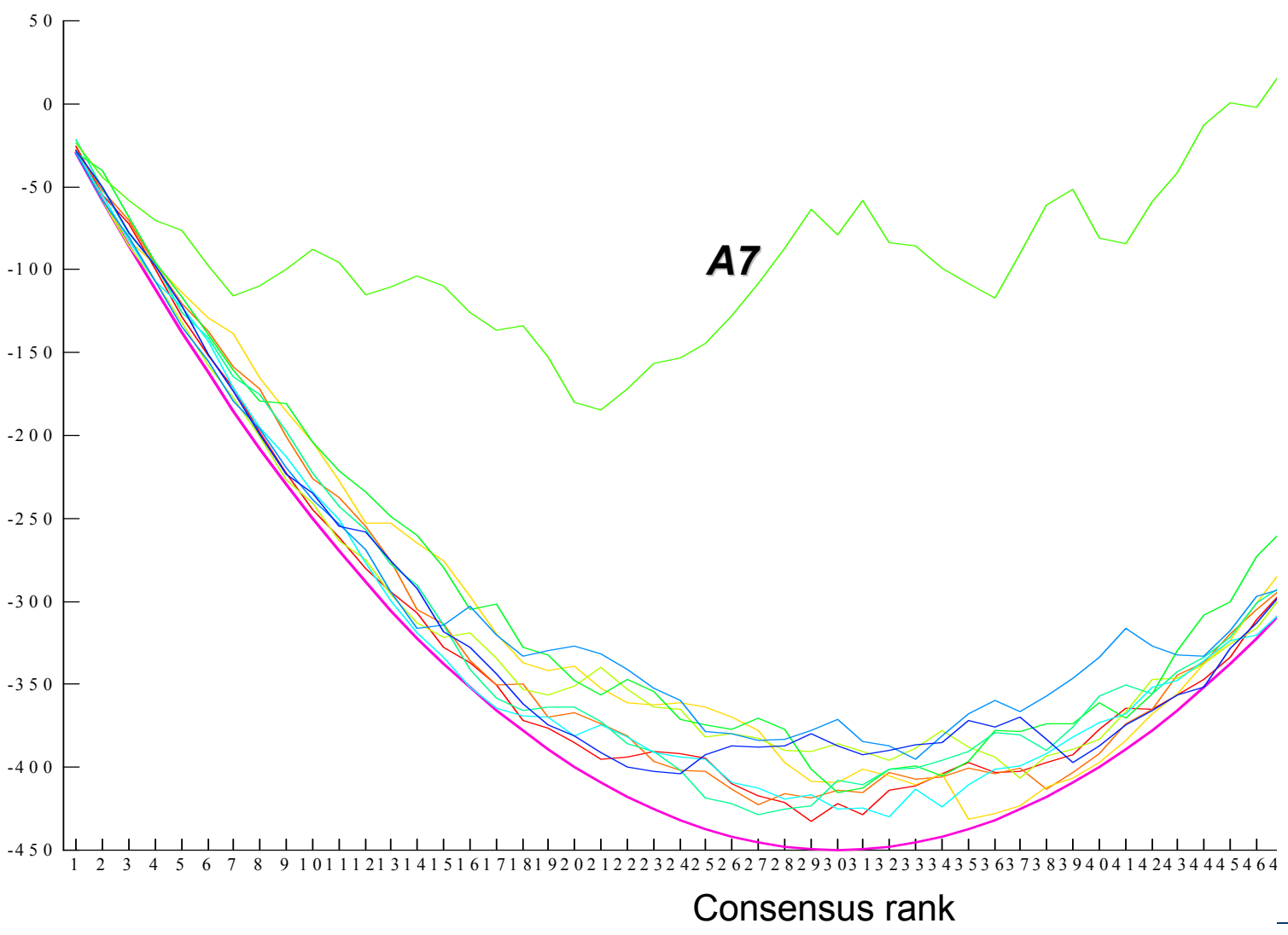


Consensus rank

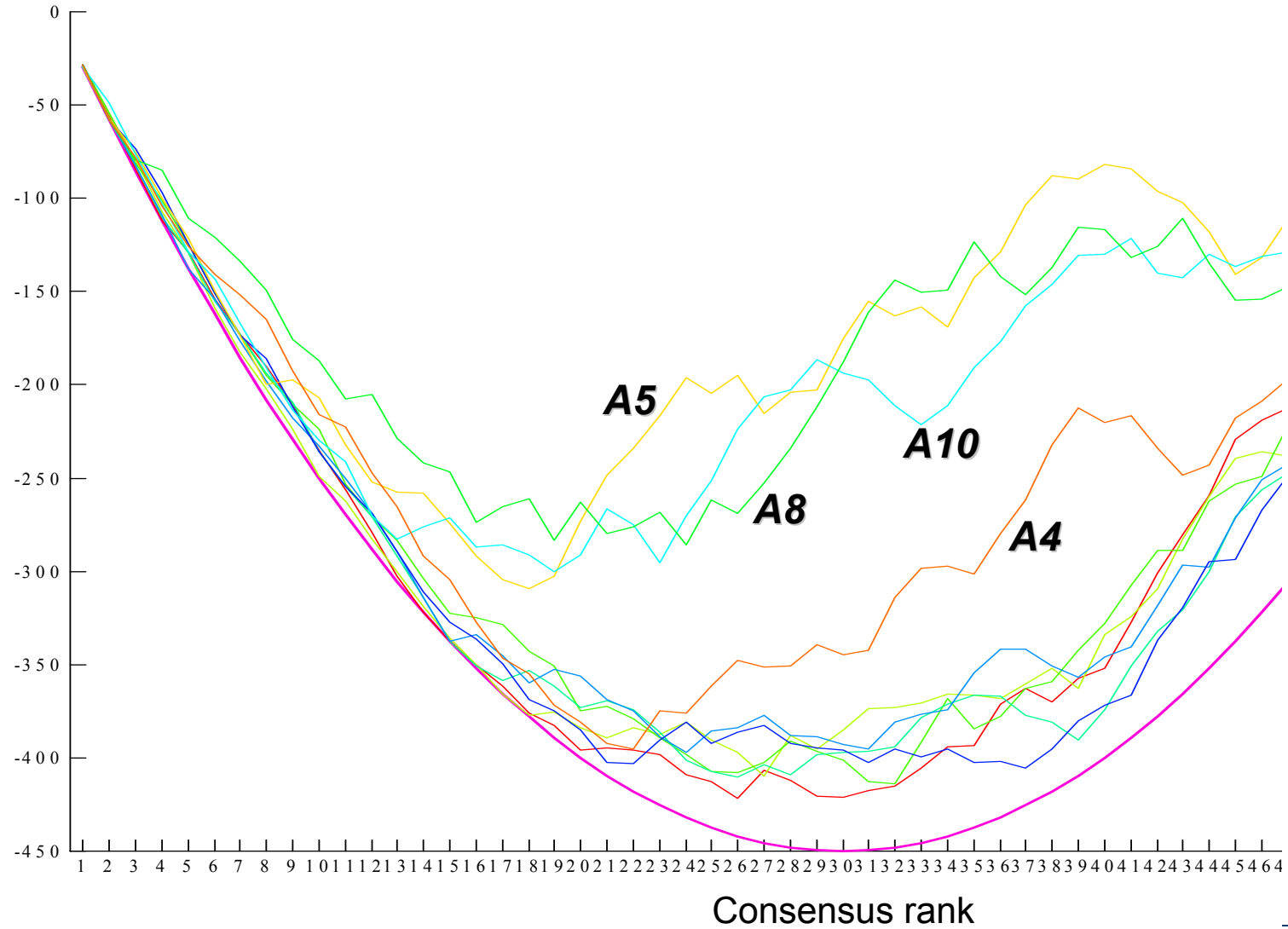
# Eggshell Plot - Hardness



# Eggshell Plot - Mealiness



# Eggshell Plot - Pea Flavour



- A project with industry, KVL (Royal Veterinary and Agricultural University, Denmark) and Matforsk to develop a new version of Panel Check
- Involve about 10 companies from Denmark and Norway
- The companies have different traditions in panel monitoring
  - Is it always necessary to have a replicate?
  - How advanced should the program be ?
- Consider other univariate and multivariate techniques for panel monitoring (PCA, GPA, other?)

- Include Multivariate techniques (H. Martens)
  - Alias correction: Correct for missing data
  - Level/range correction (correction for use of scale)
  - Improved panel average:
    - ◆ An assessor does not agree with the consensus of the panel
    - ◆ => this assessor will be weighted lower
    - ◆ => less influence in the panel mean
- Planning: Different modules in the program (training of assessors, assessor performance, analyzing results, improved panel performance)

Thank you for listening!