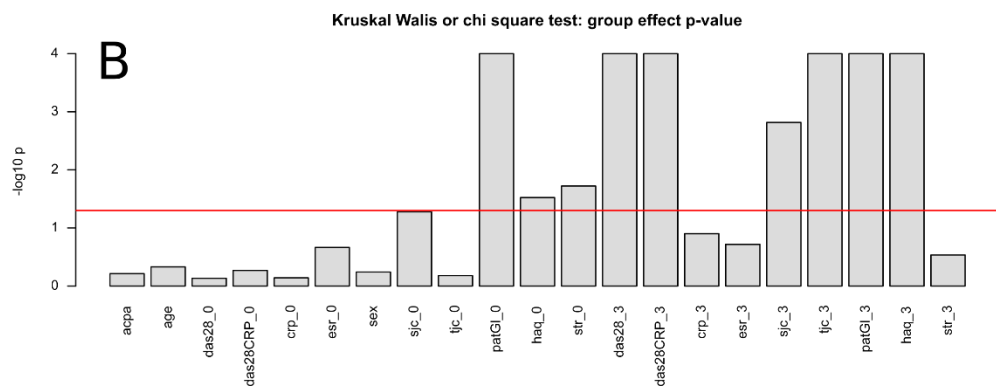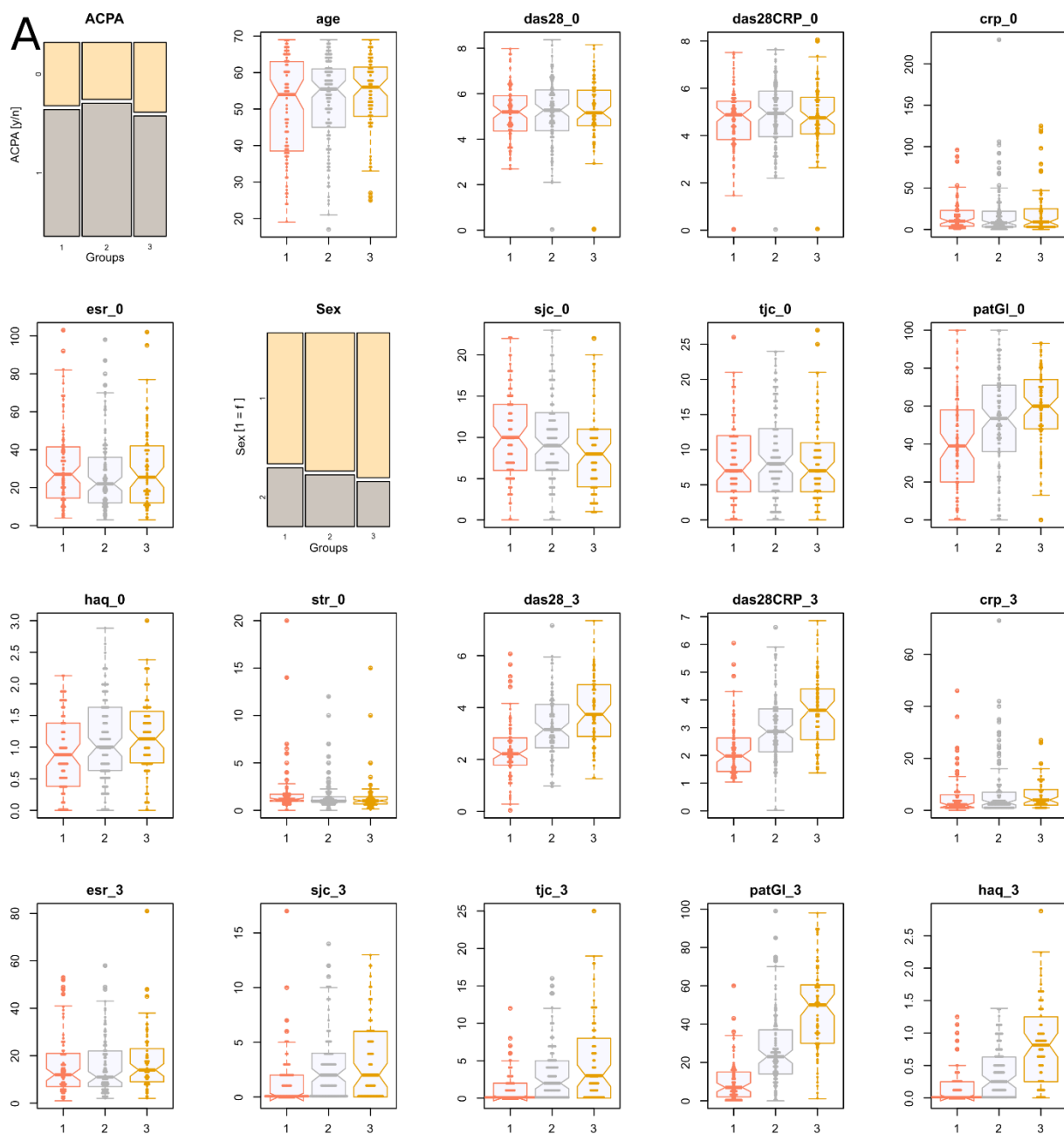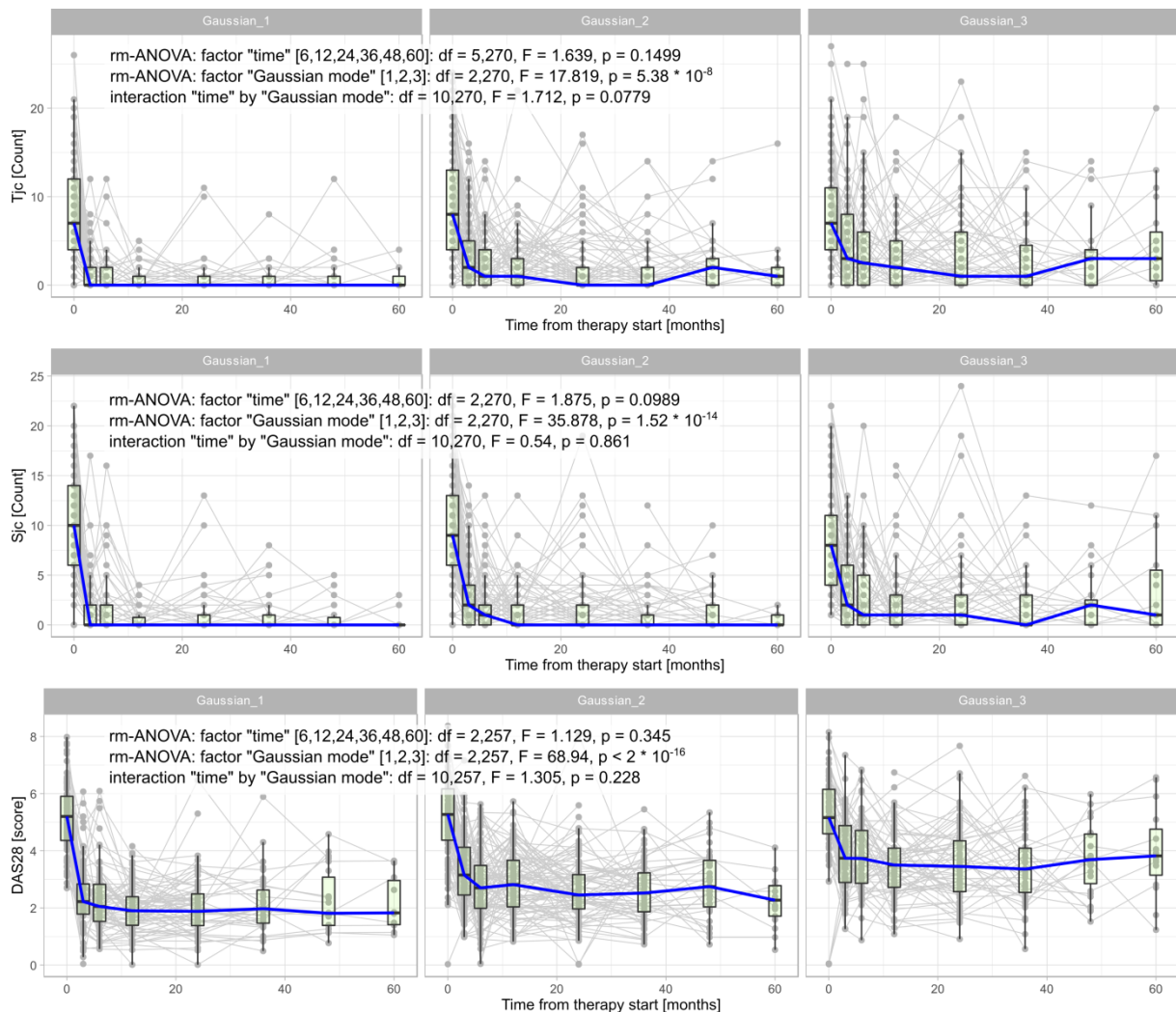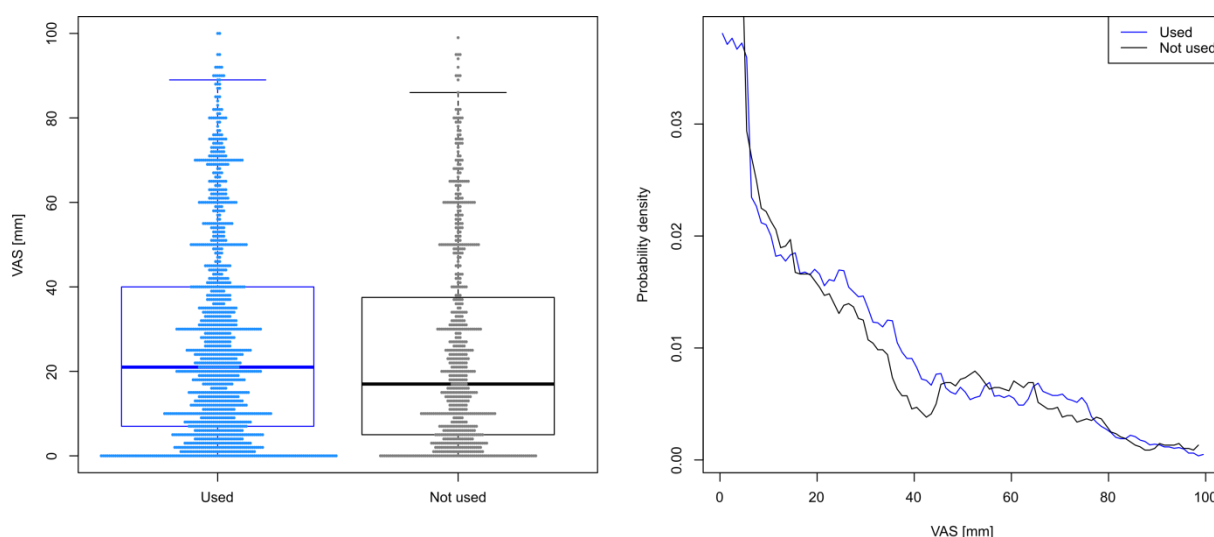**Supplementary Figures**

Supplementary Figure 1: Clinical and laboratory parameters (features) acquired from patients with rheumatoid arthritis, separately for the pain related phenotype groups identified in this analysis (**Error! Reference source not found. A:** Raw data and basic descriptive statistics, show as box plots for interval or ordinal scaled parameters, and as mosaic plots for binary parameters. The data are shown in alphabetical order of feature names. The widths of the boxes are proportional to the respective numbers of subjects per group. The quartiles and medians (solid horizontal line within the box) are used to construct a "box and whisker" plot. The whiskers add 1.5 times the interquartile range (IQR) to the 75th percentile or subtract 1.5 times the IQR from the 25th percentile and are expected to include 99.3% of the data if normally distributed. The notches indicate the confidence interval around the median based on $median \pm 1.57 \cdot IQR/n^{0.5}$. **B:** Results of ANOVA for ranks analysis for interval or ordinal scaled parameters, and of χ^2 tests of binary parameters, with respect to pain phenotype group differences. P-values are shown as *–log10(p)*, with the horizontal red line drawn at p = 0.05. Bars exceeding this line indicate significant pain phenotype group differences at an uncorrected α level. The figure has been created using the R software package (version 3.4.4 for Linux; http://CRAN.R-project.org/ [5]).

A

ACPA | age | das28_0 | das28CRP_0 | crp_0

esr_0 | Sex | sjc_0 | tjc_0 | patGl_0

haq_0 | str_0 | das28_3 | das28CRP_3 | crp_3

esr_3 | sjc_3 | tjc_3 | patGl_3 | haq_3

str_3

B Kruskal Walis or chi square test: group effect p-value

Supplementary Figure 2: Data structure found in the input space of d = 21 clinical and laboratory parameters acquired from patients with rheumatoid arthritis not later than three month after the start of the therapy. The patients were grouped with respect the pain related phenotype groups identified in this analysis (**Error! Reference source not found.**). The groups of low, medium and high median pain are color coded with yellow, green and blue, respectively. The data structure has been obtained by means of principal component analysis (PCA) on the log-transformed data as suggested by the results of a PC-corr analysis [1]. The PCA plot associated to this analysis shows the sample separation in the first to third components (PC1, PC2 and PC3) as explaining most of the variance in the data and having eigenvalues > 1 [3; 4]. The group-wise marginal distributions of the data are shown in each PC plot. In addition, in the lower right corner the factor loadings with respect to the clinical and laboratory parameters are shown. The figure has been created using the R software package (version 3.4.4 for Linux; http://CRAN.R-project.org/ [5]) and the library "ggplot2" (https://cran.r-project.org/package=ggplot2 [8]).

Supplementary Figure 3: Time courses of the parameters TJC, SJC and DAS28 per subgroup defined by Gaussian mode membership (Figure 2 in the main document). The Spaghetti plots show the single data as dots, connected by straight lines. The overlaid box and whisker plots show basic summary statistics of the parameters for each time point. In addition, results of repeated measures analyses of variance (rm-ANOVA) with "time" as within-subject factor and "Gaussian mode" as between-subjects factor are provided numerically. The figure has been created using the R software package (version 3.4.4 for Linux; http://CRAN.R-project.org/ [5]) and the R packages "beeswarm" (https://cran.r-project.org/package=beeswarm [2]) and "ggplot2" (https://cran.r-project.org/package=ggplot2 [8]).

Supplementary Figure 4: Distribution of the VAS ratings of pain in the whole study cohort of n = 789 patients, separately for the n = 288 patients included in the analysis blue) and the rest of the patients (n = 501) who had been included in the analysis because to many missing values of the pain ratings (a minimum of four VAS pain ratings was set as requirement for inclusion). All VAS ratings acquired between 3 and 60 months after RA diagnosis are plotted. **Left panel:** The quartiles and medians (solid horizontal line within the box) are used to construct a "box and whisker" plot. The whiskers add 1.5 times the interquartile range (IQR) to the 75th percentile or subtract 1.5 times the IQR from the 25th percentile and are expected to include 99.3% of the data if normally distributed. Single data are overlaid over the boxplots as dots. As the not used data had many missing values, the total number of data points is smaller than that of the used data, despite the fact that more subjects were in the not used category (see above). **Right panel:** The probability density function of the VAS ratings (PDF) estimated by means of the Pareto density estimation (PDE [6]). The figure has been created using the R software package (version 3.4.4 for Linux; http://CRAN.R-project.org/ [5]) and the R packages "beeswarm" (https://cran.r-project.org/package=beeswarm [2]) and AdaptGauss (https://cran.r-project.org/package=AdaptGauss [7]).

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