Models Can Lie

An Illustration from Heart Rate Variablity Data

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Overview

1. Background

2. How data looks like

3. Classification with series stack

4. Classification with series averaged over Series repetition

5. Classification with series averaged over Person-Event Combination

6. Some Comparison

Background

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    - Transpose of each frequency windows stacked together
    - The average frequencies over time for each Series
    - The average frequencies over time for each person-event combination
5. LDA model is used for discriminant analysis using the scores obtained form each of the latent variable model with cross-validation implemented

How data looks like

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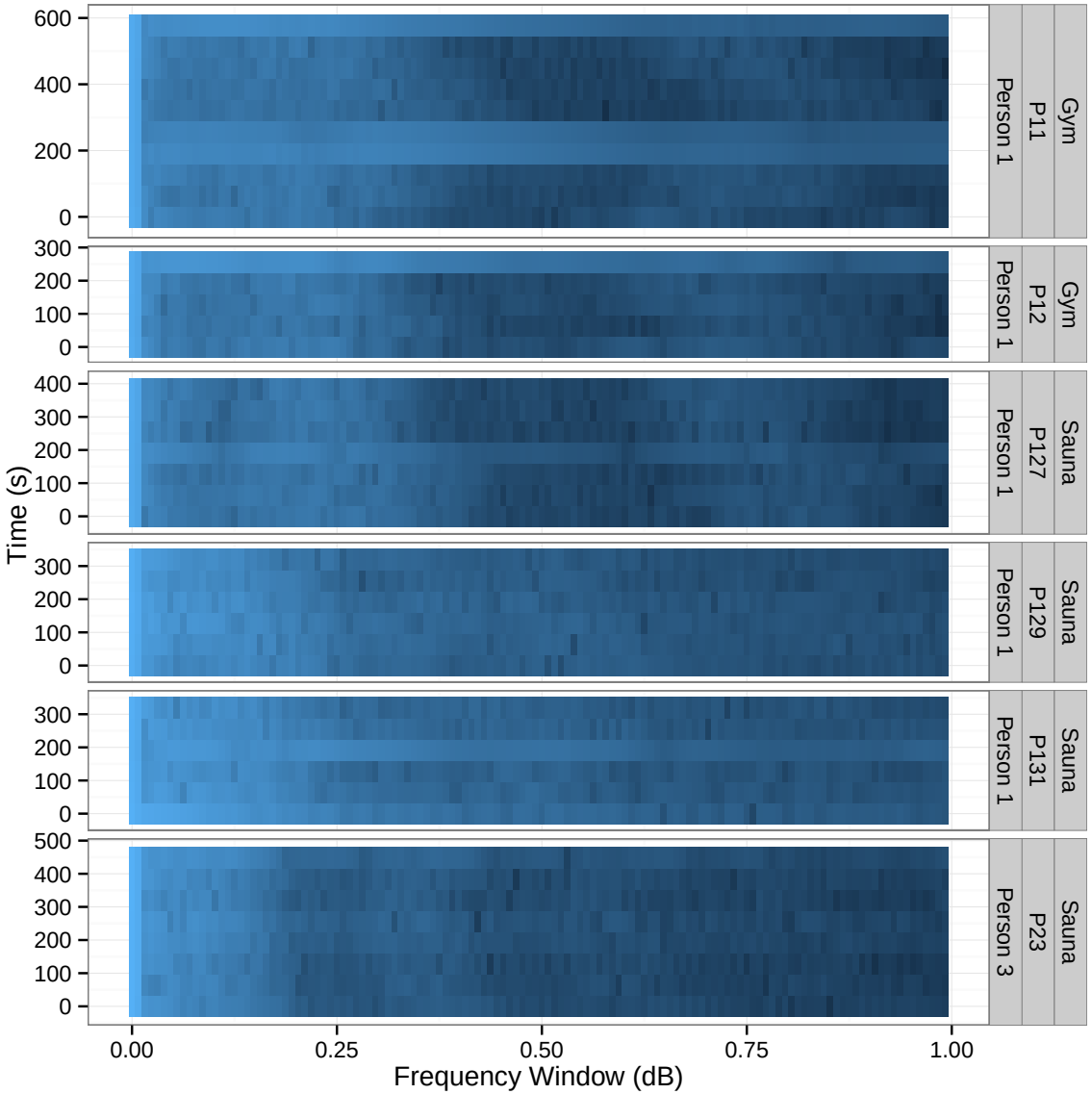

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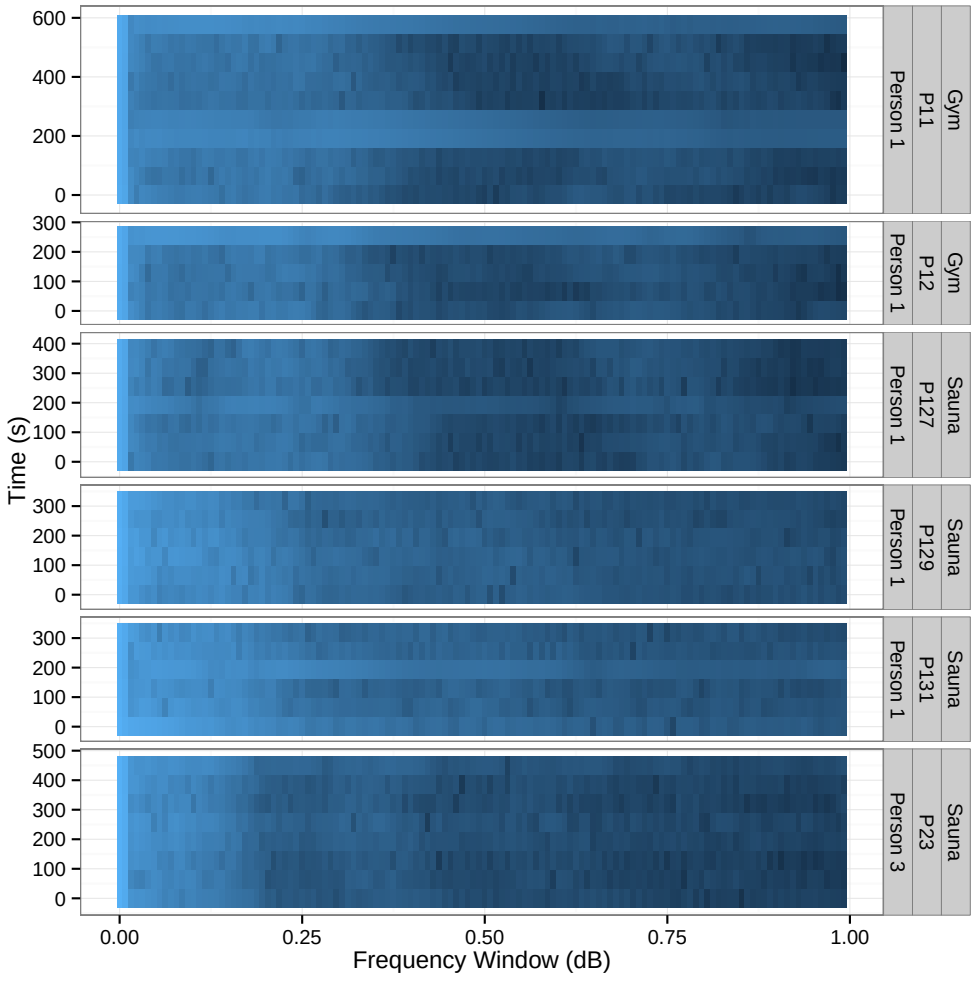

- Each block represent a series divided into several windows (rows), 128 columns each with 16 overlaps. The cell contains the frequency values obtained from fast fourier transform

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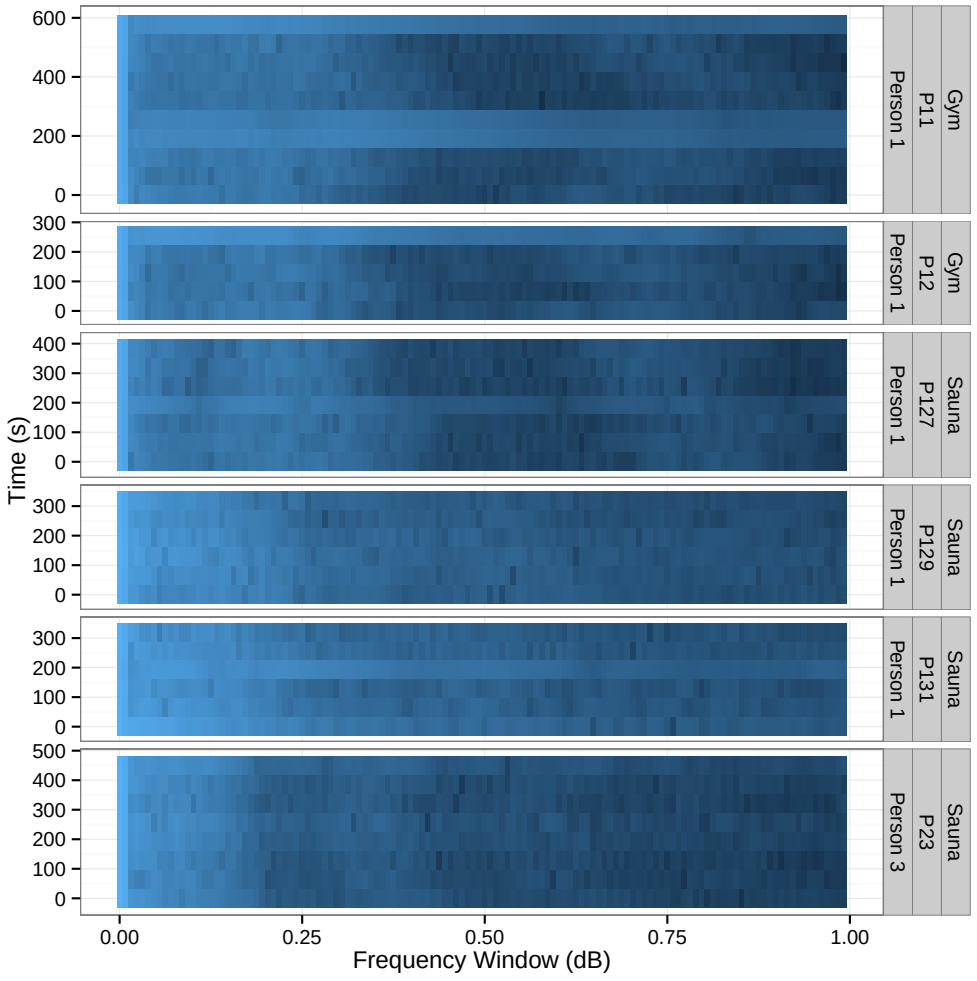
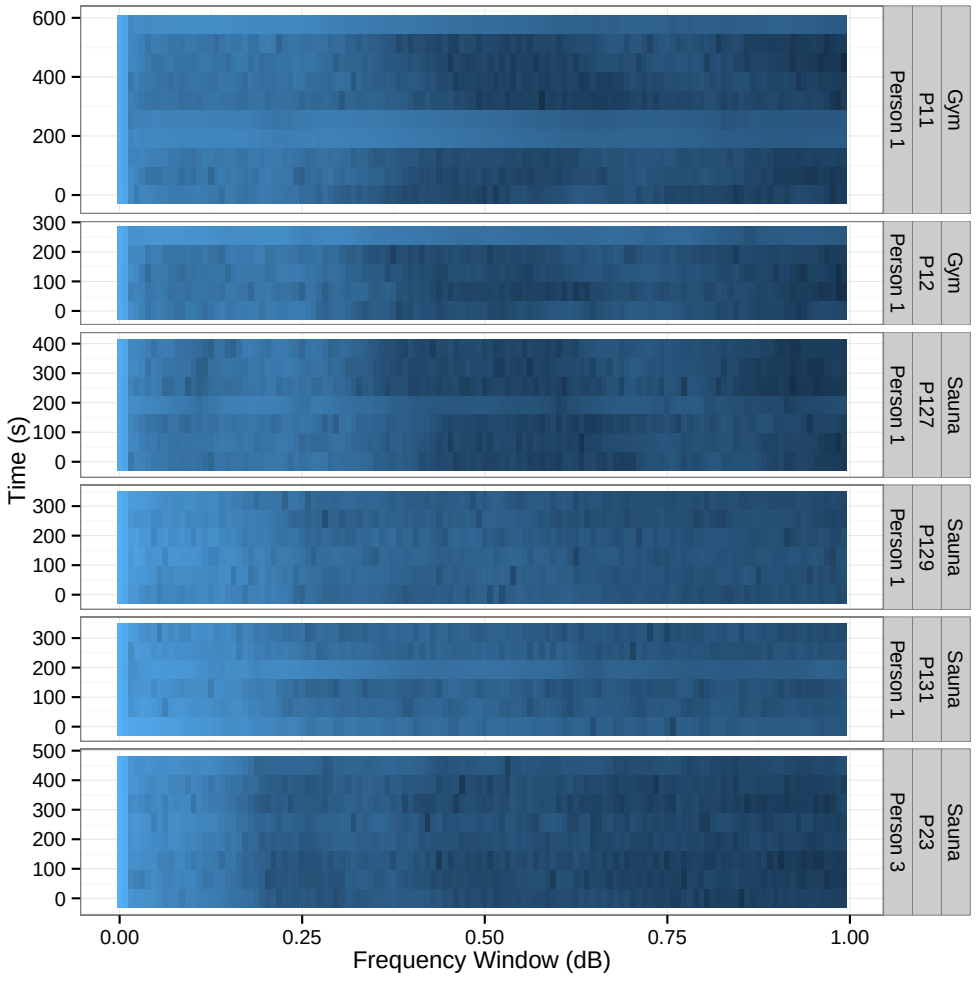


- Each person may have involved into multiple activities which may have replications

How data looks like



- Set 1: Each windows are stacked in a row to form a big matrix (may suffer from repeated measurement). This contains different parts of same series in various rows.

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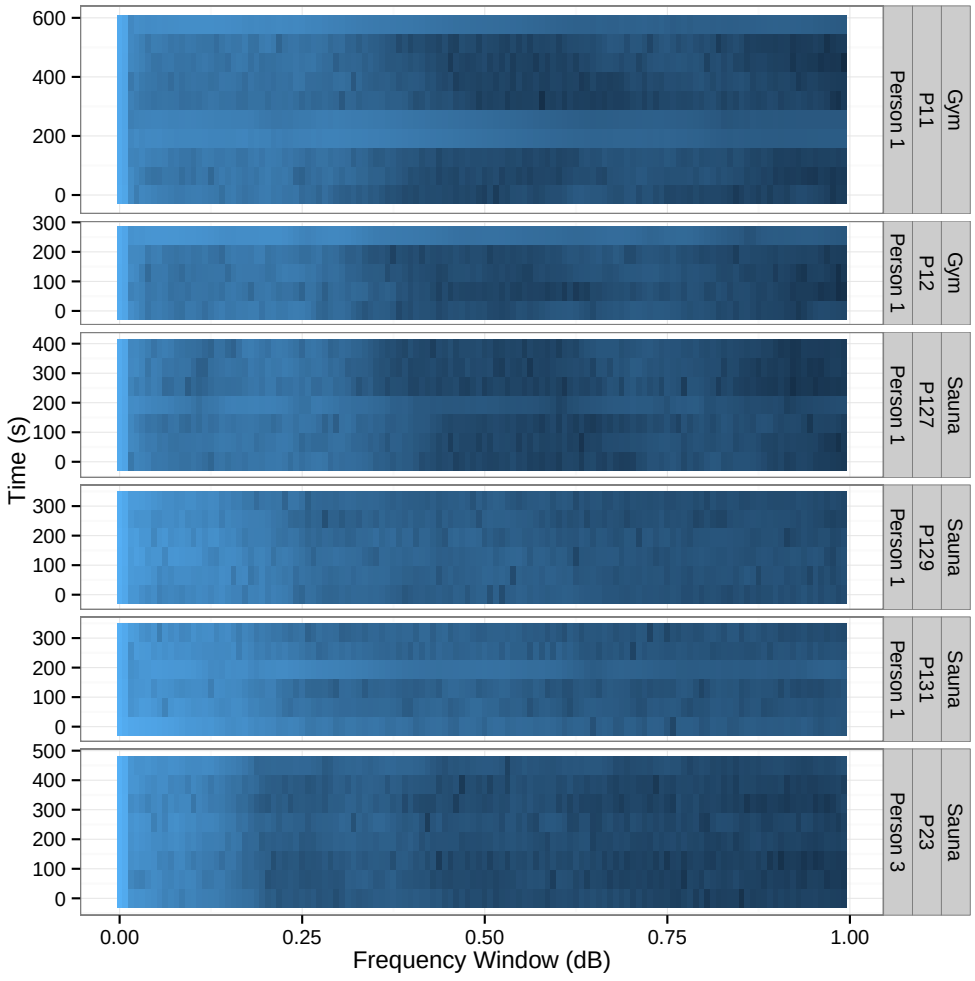
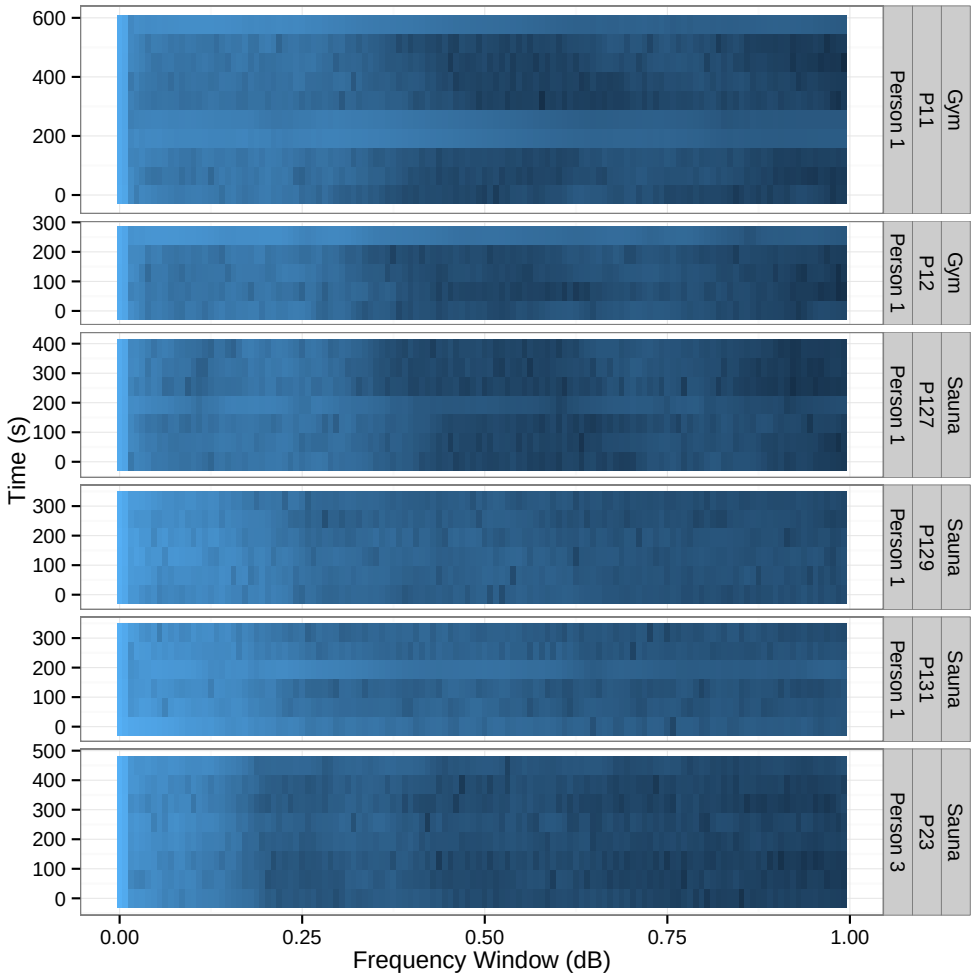


- Set 2: Each series are averaged over different time points. Each row corresponds to one series.

How data looks like

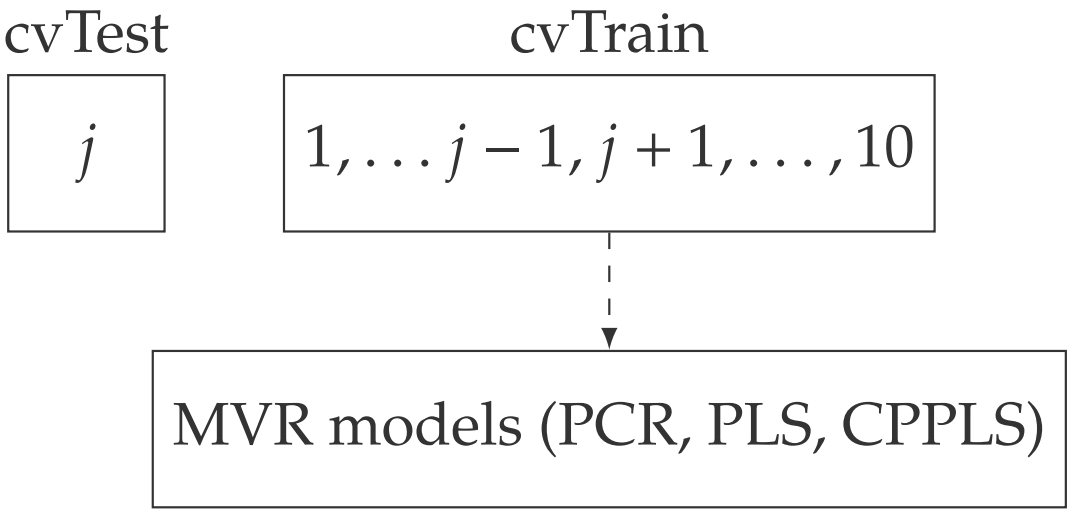


- Set 3: A person can have multiple series of same activity (replication), the third set is averaged over each person-event conbination. In this case each row corresponds to some specific event for some specific person

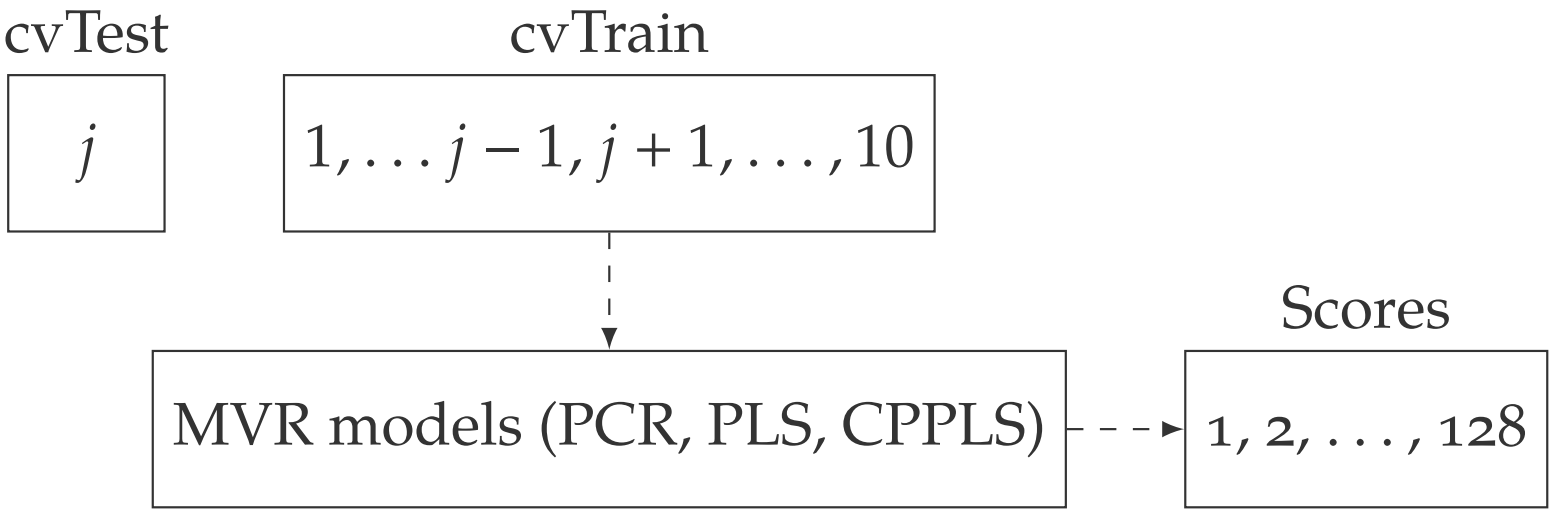
Cross-Validation

cvTest	cvTrain
j	$1, \ldots j-1, j+1, \ldots, 10$

Cross-Validation



Cross-Validation



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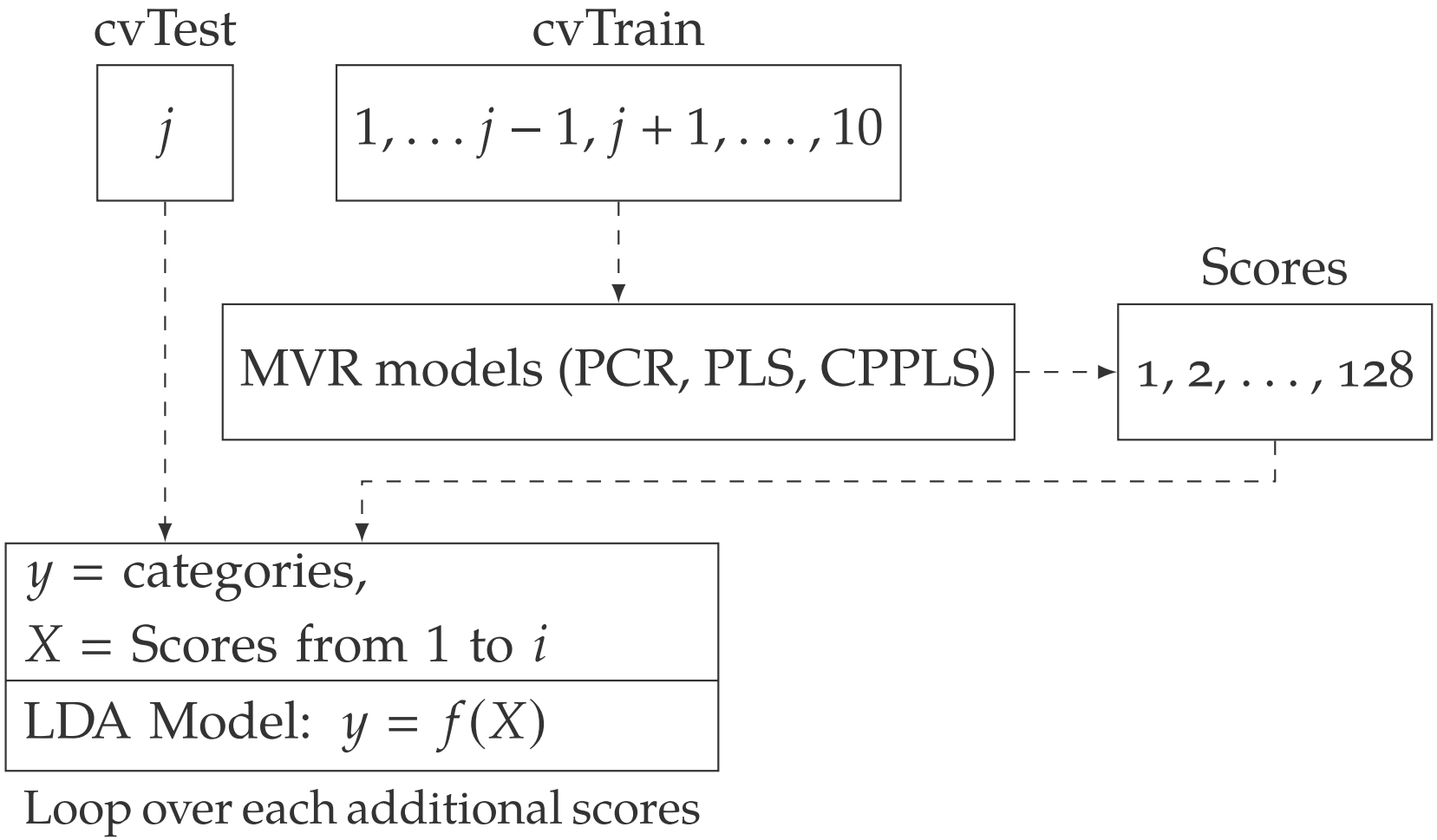

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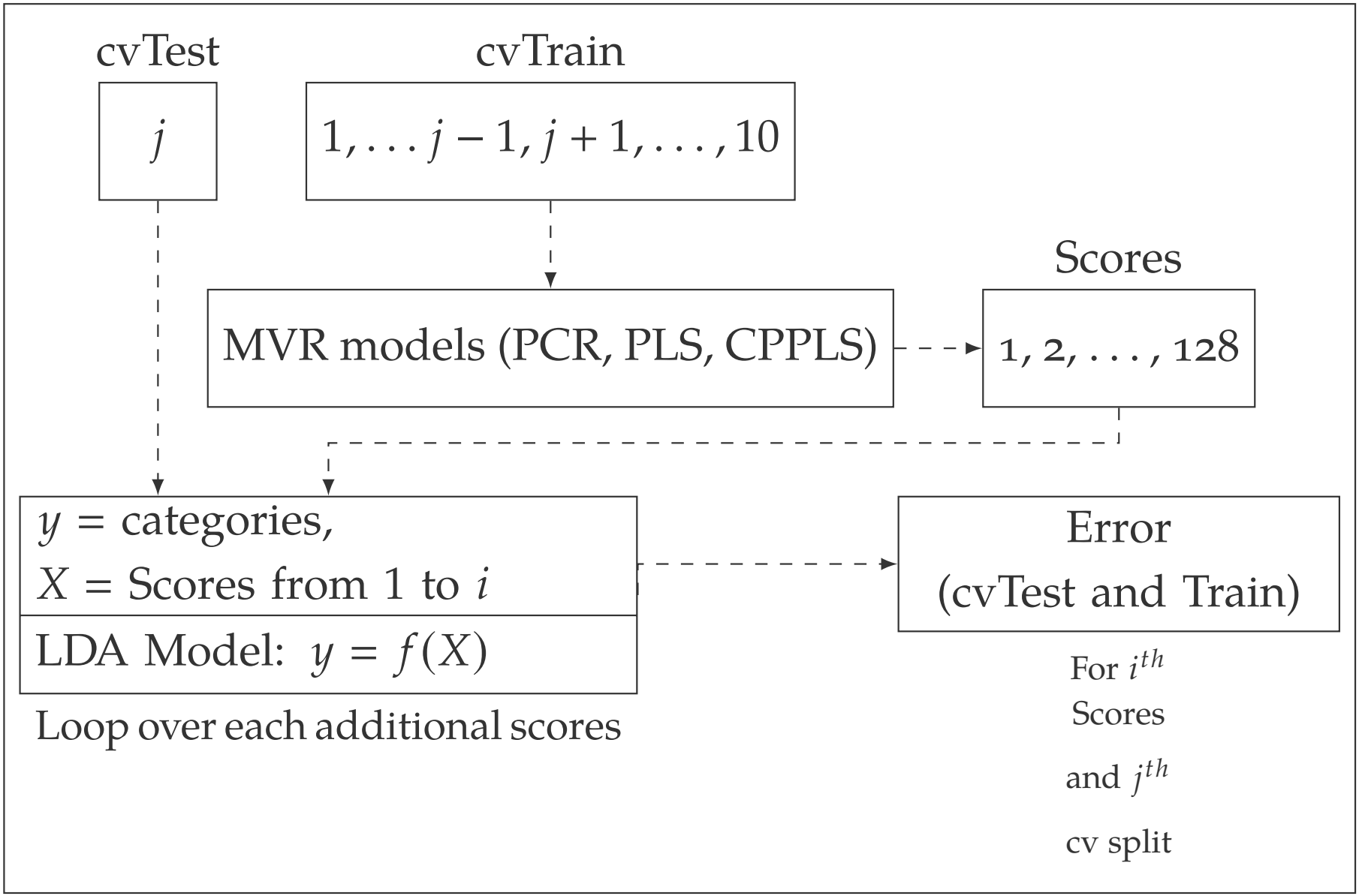
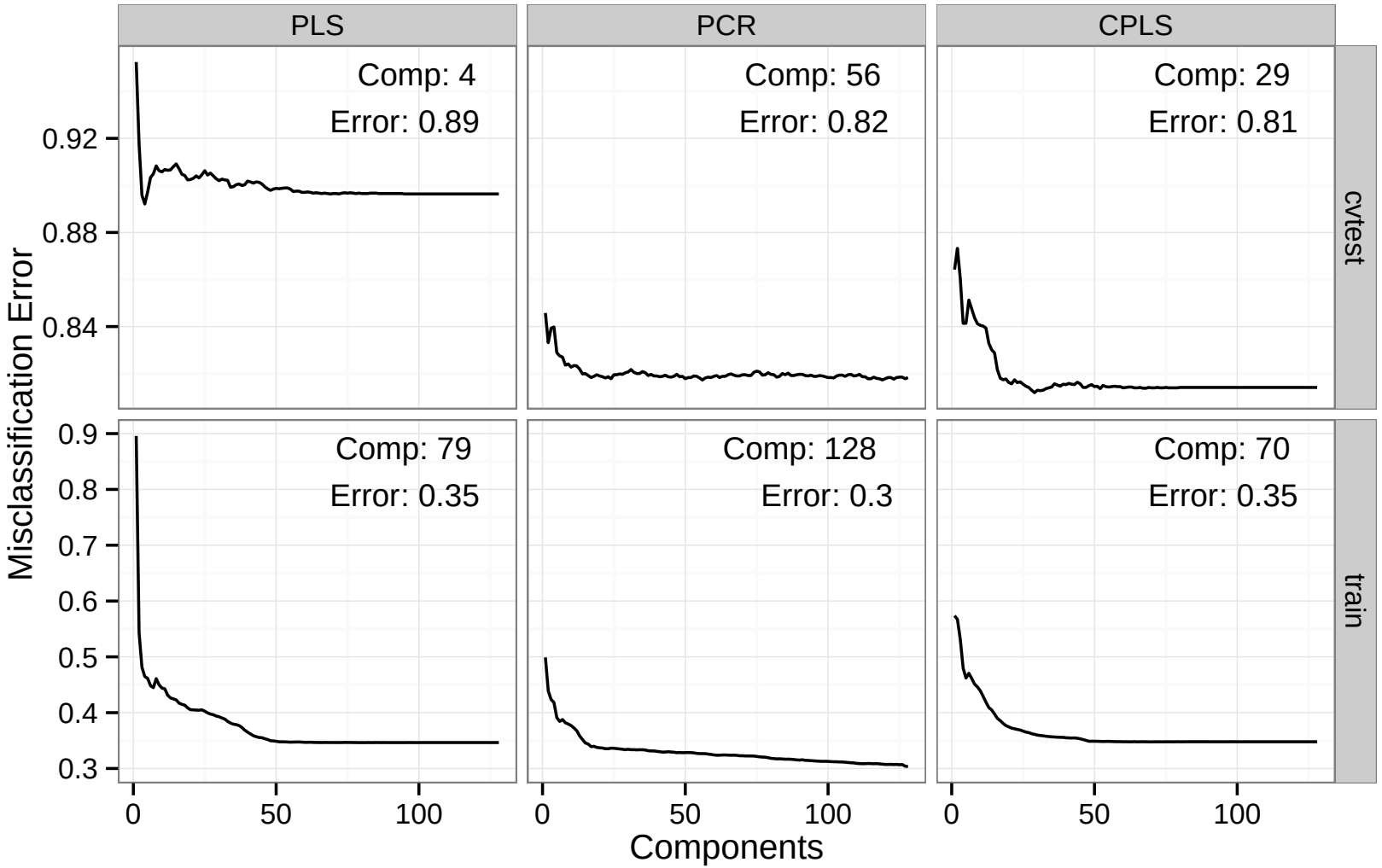


Cross-validation Loop

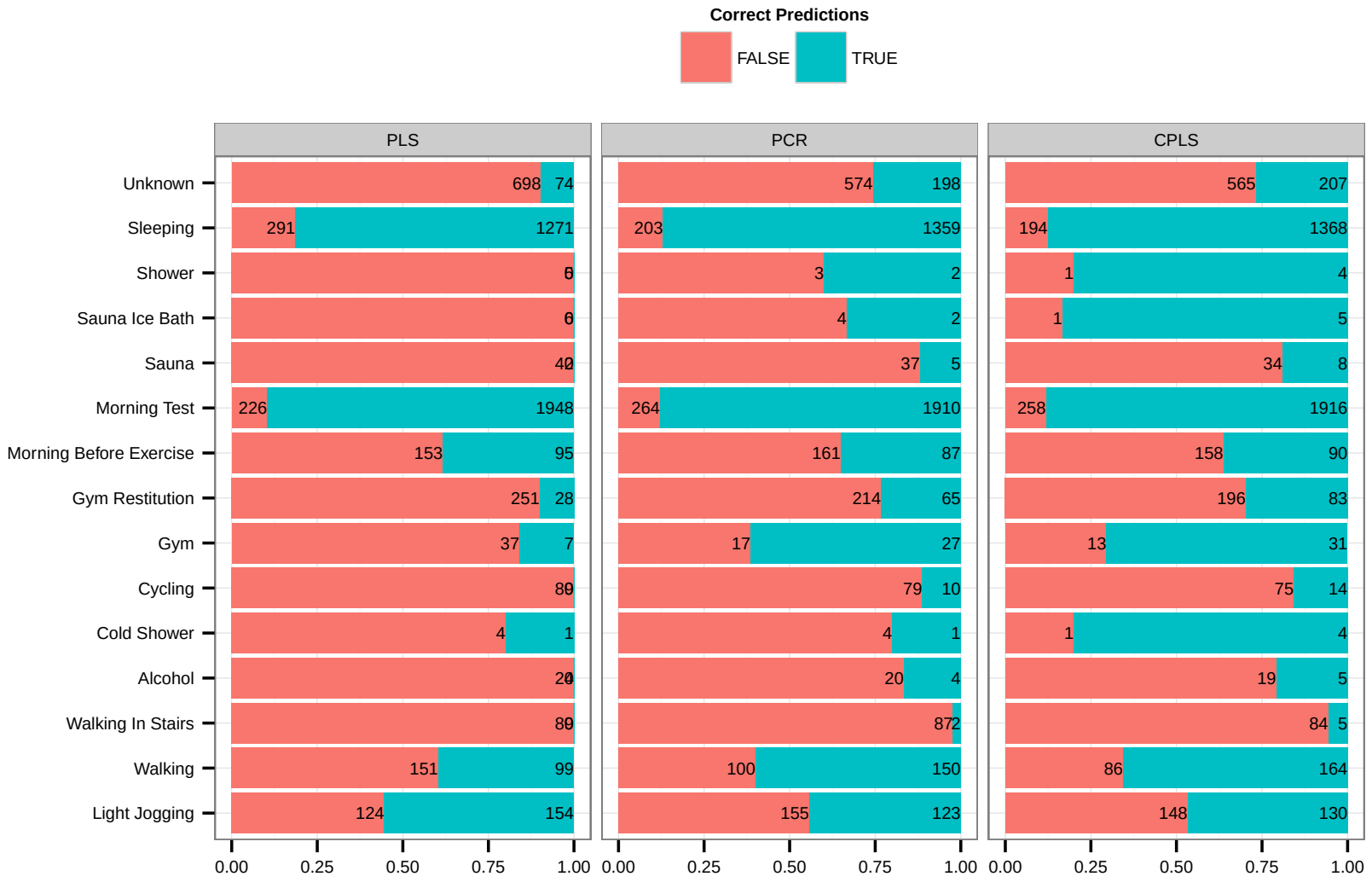
Classification with series stack

Training and Cross-validation Errors



Misclassifications

Training Misclassifications



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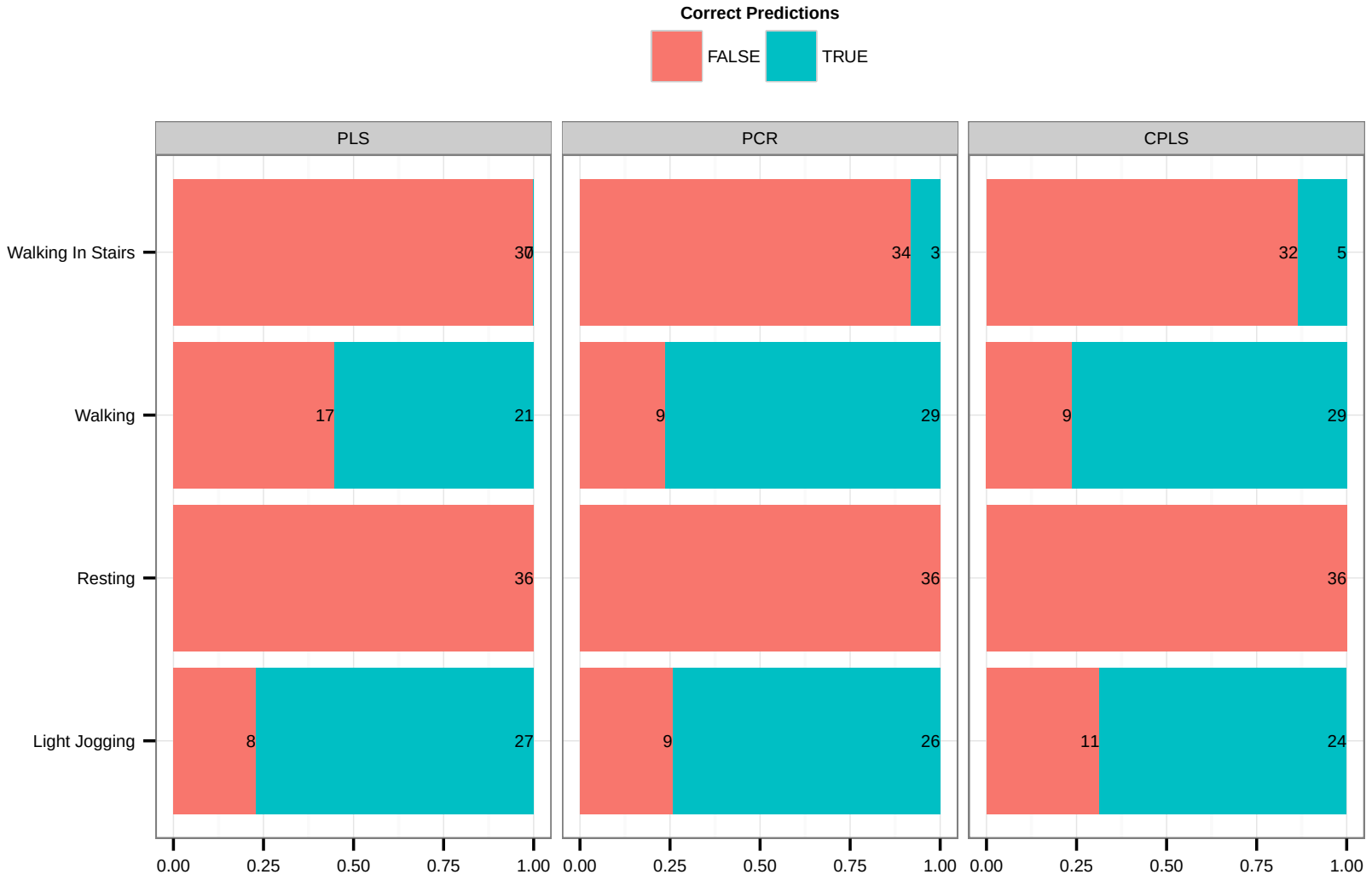
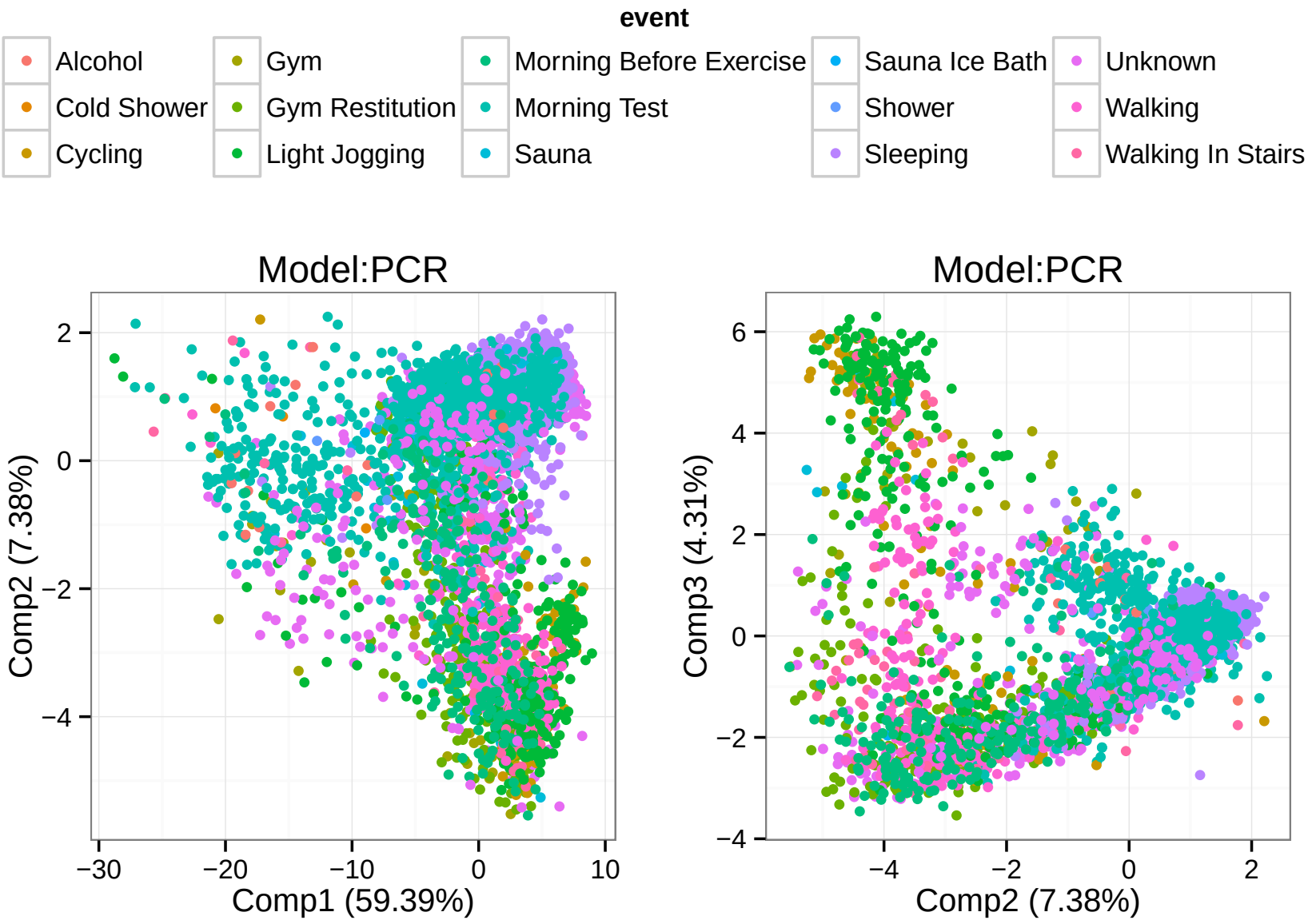
Test Misclassification



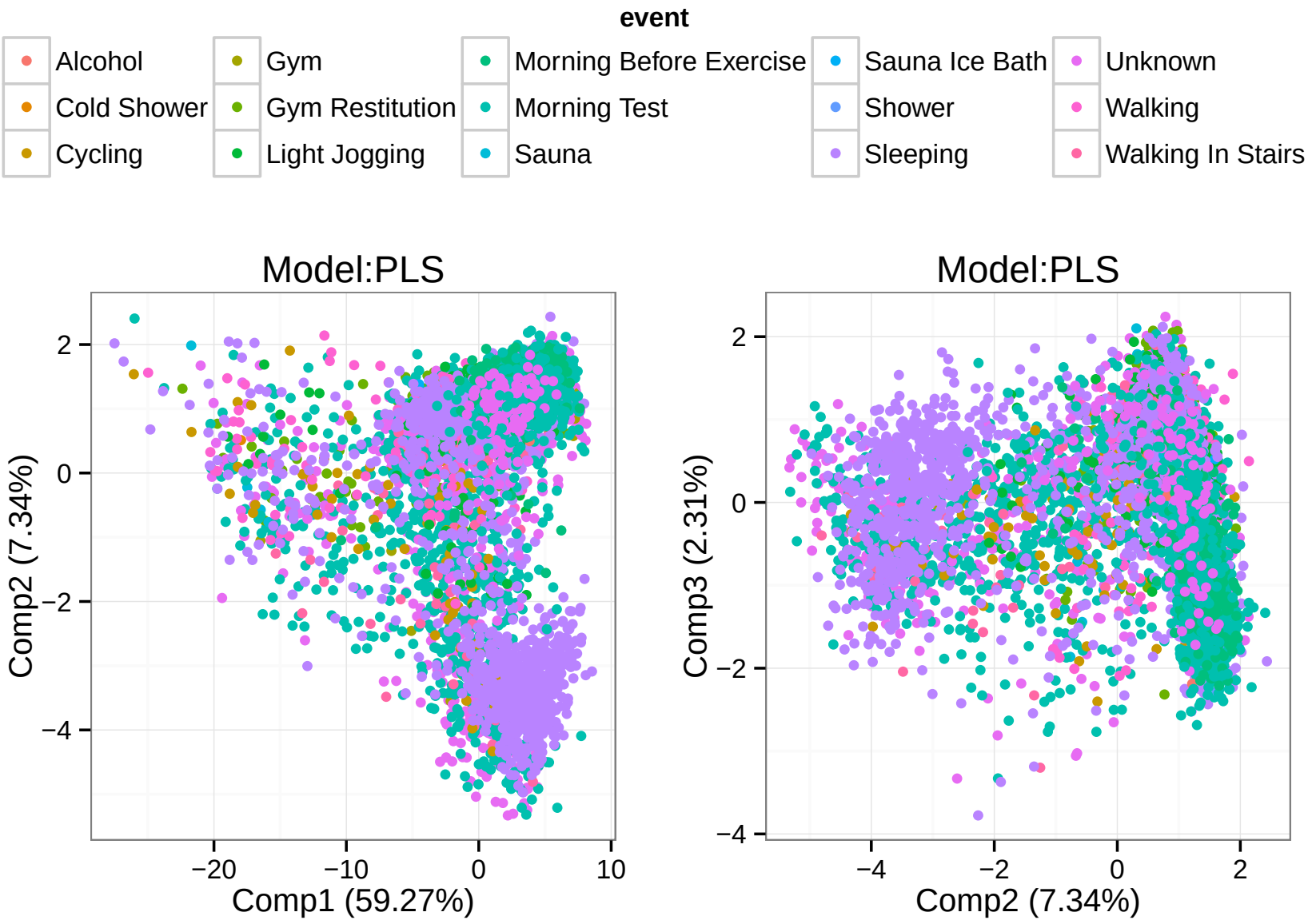
Plotting Scores

Scoreplot for PCR model



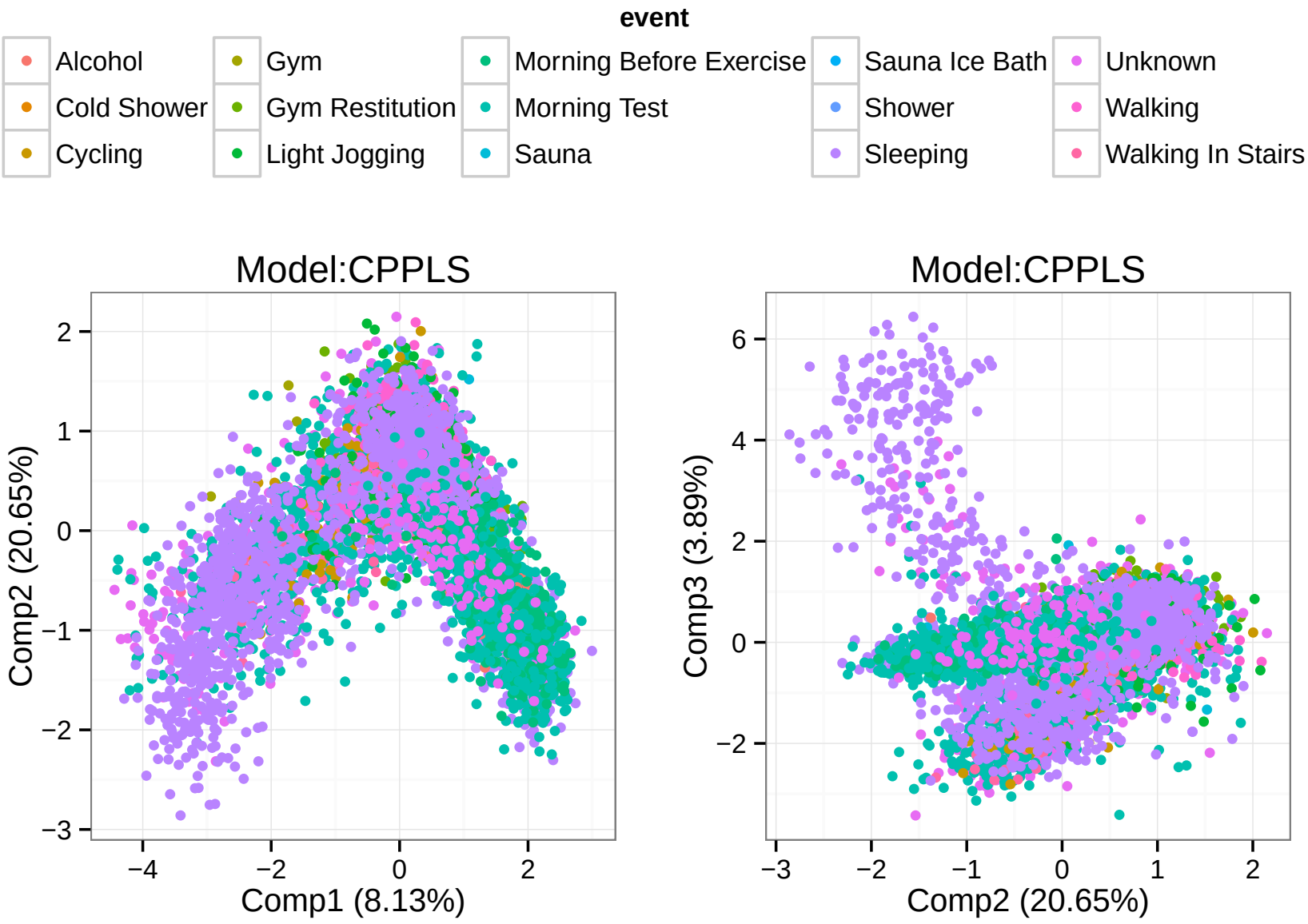
Plotting Scores

Scoreplot for PLS model



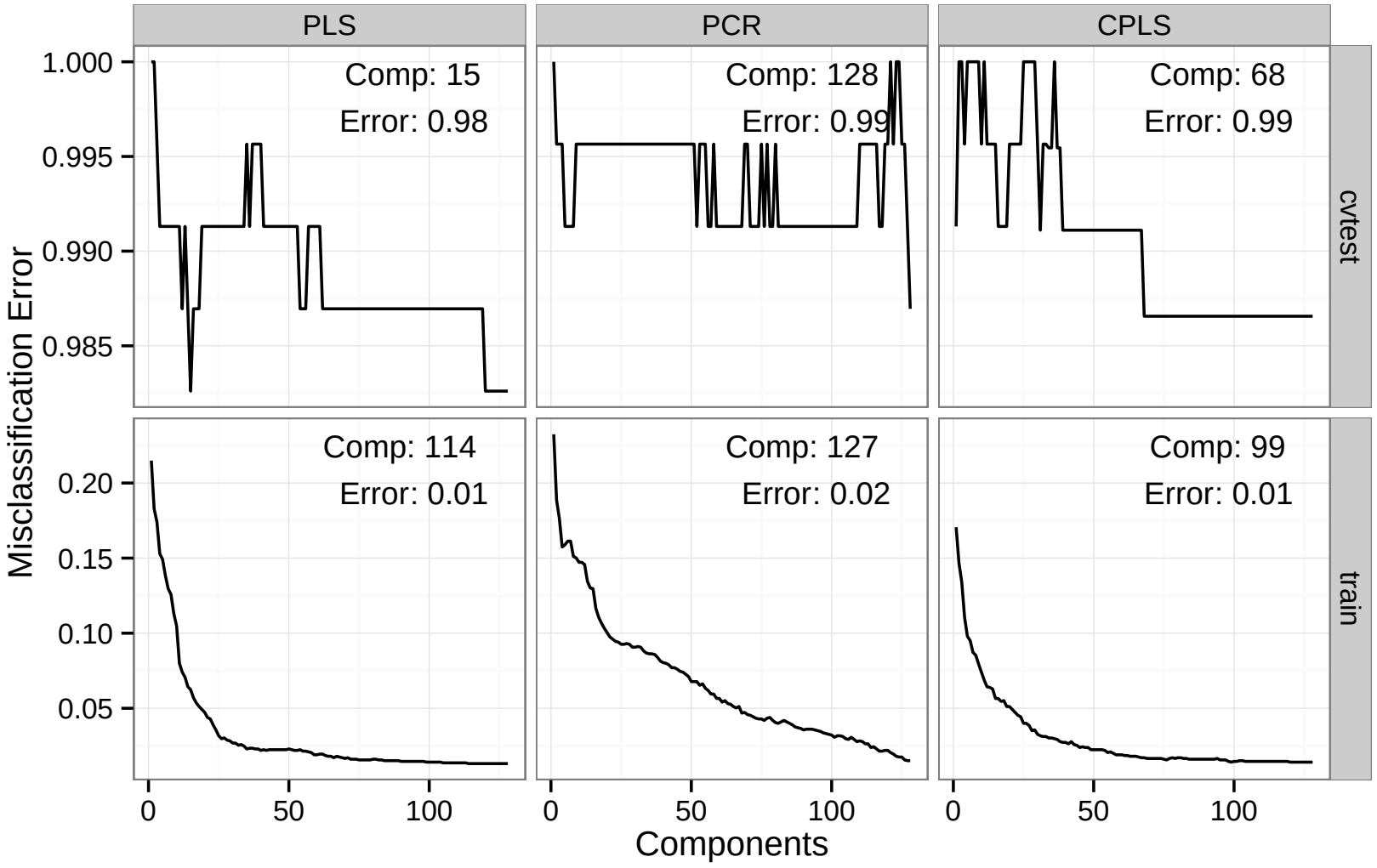
Plotting Scores

Scoreplot for CPPLS model



Classification with series averaged over Series repetition

Training and Cross-validation Errors



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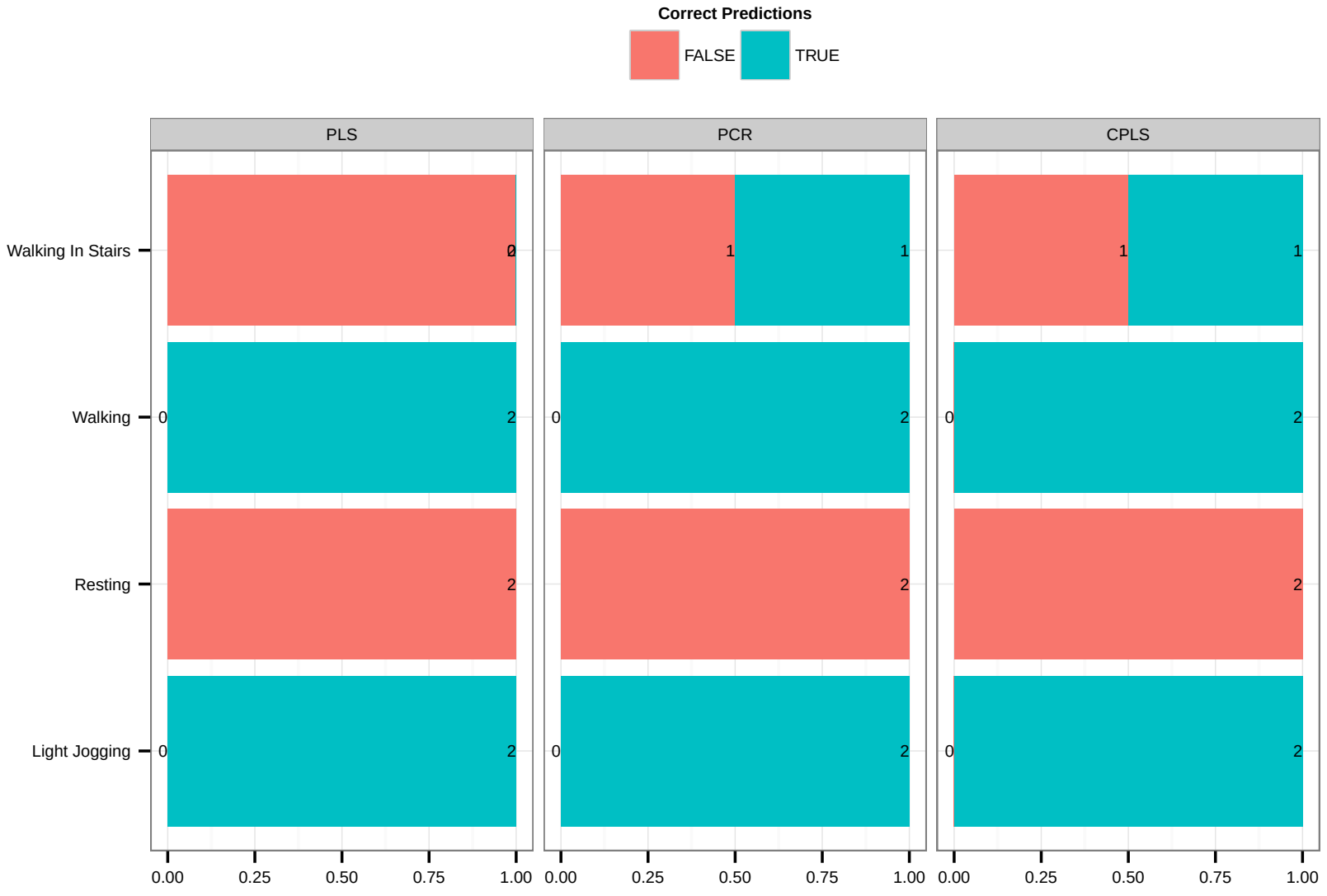

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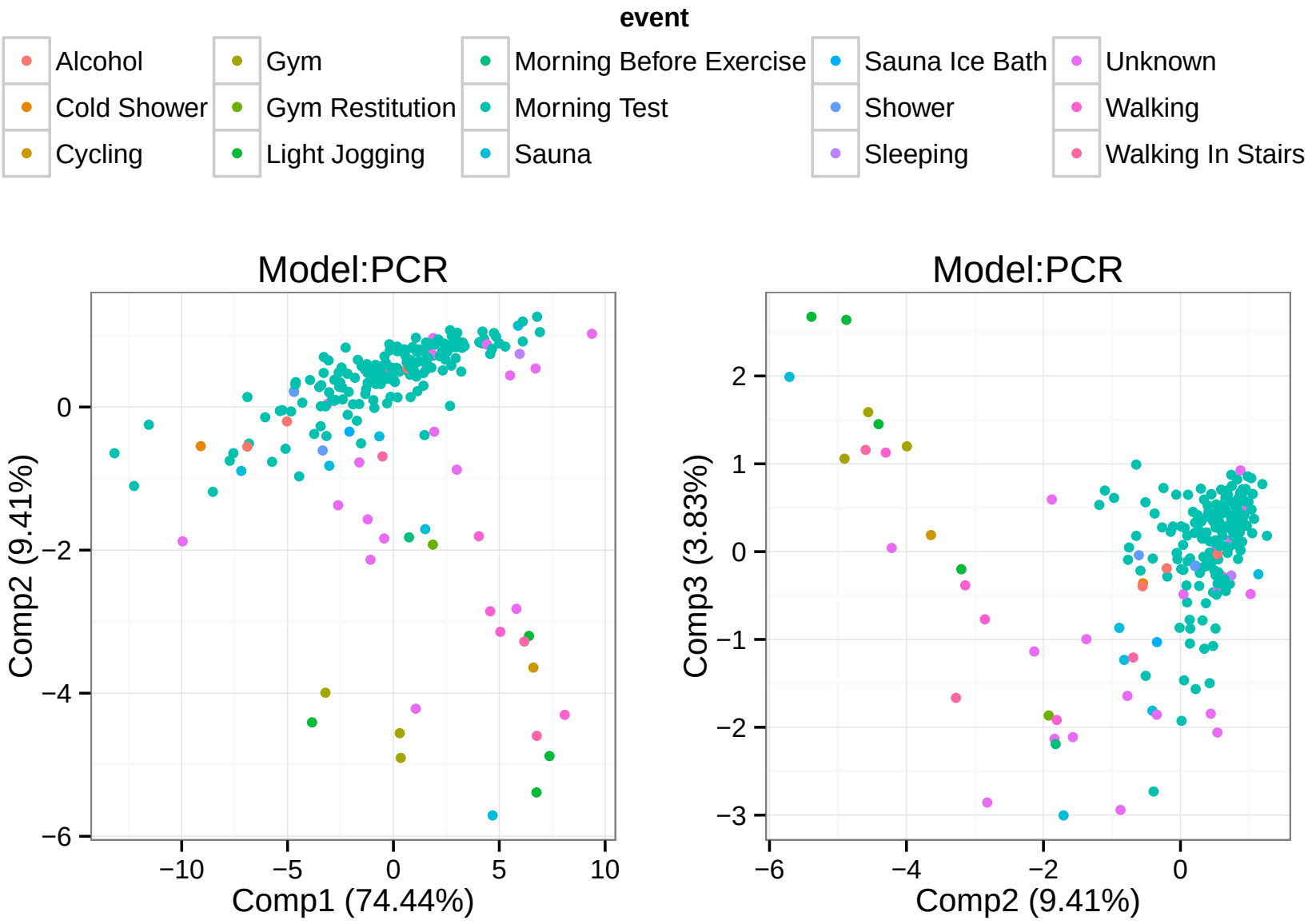

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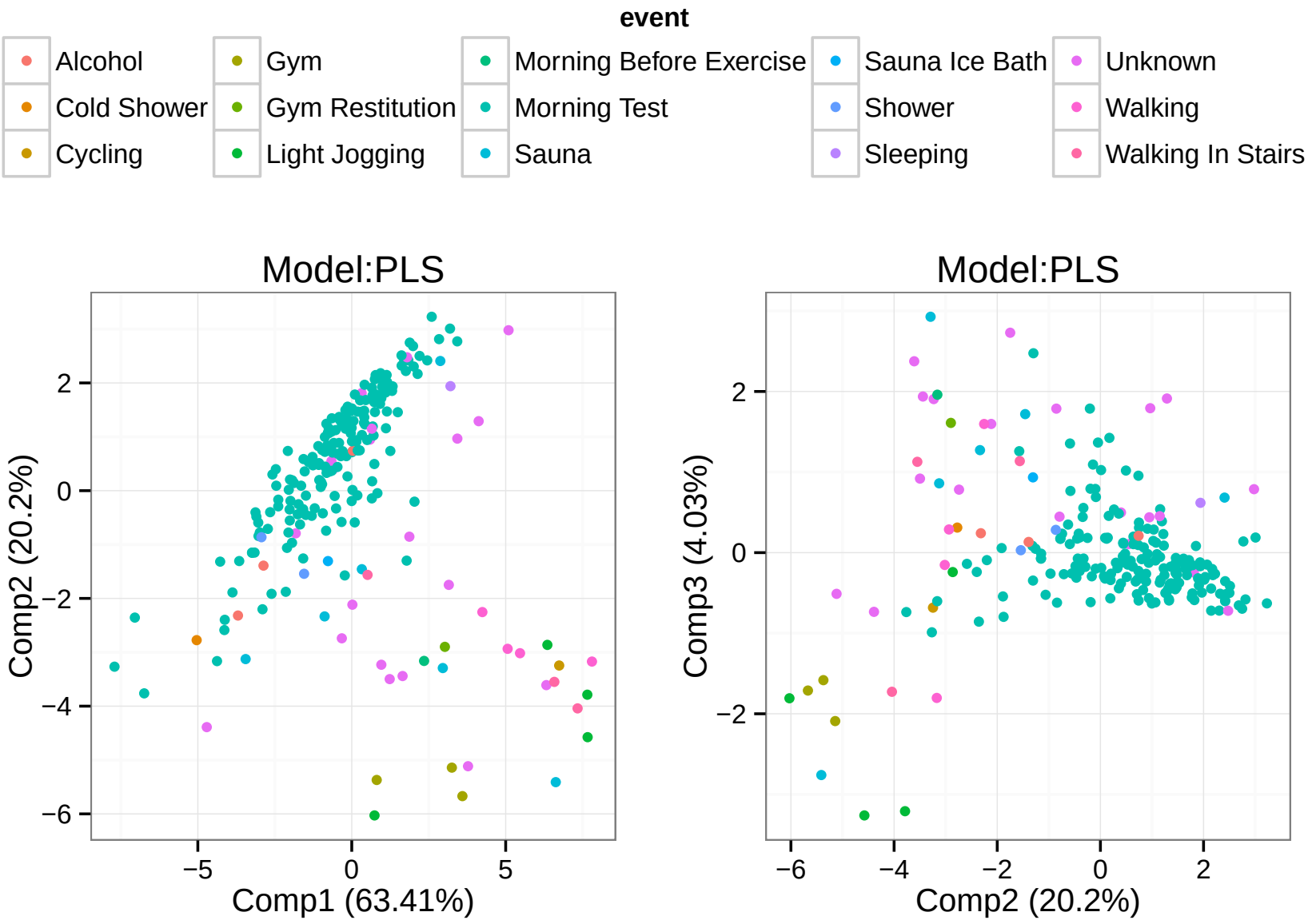
Scoreplot for PLS model



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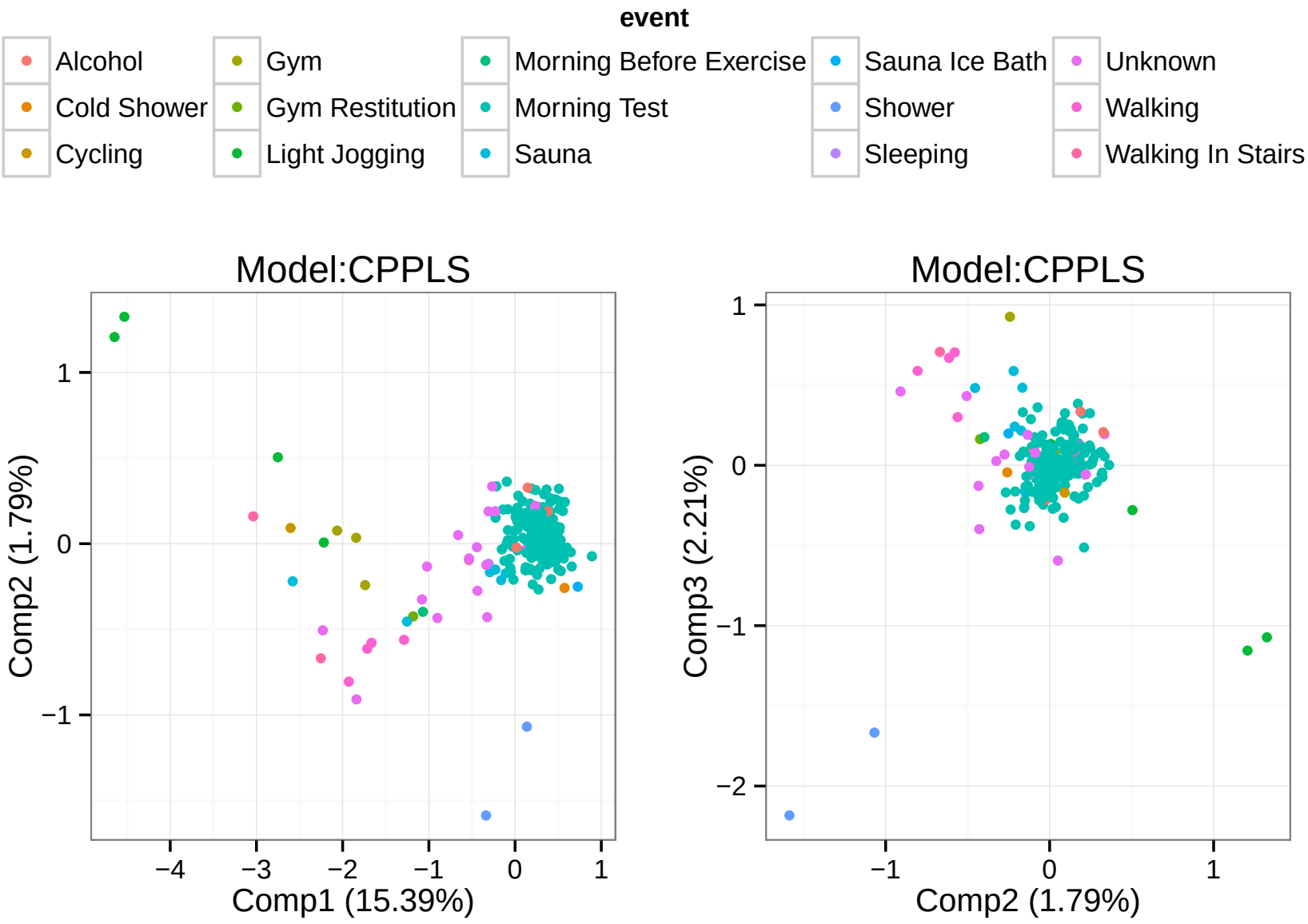
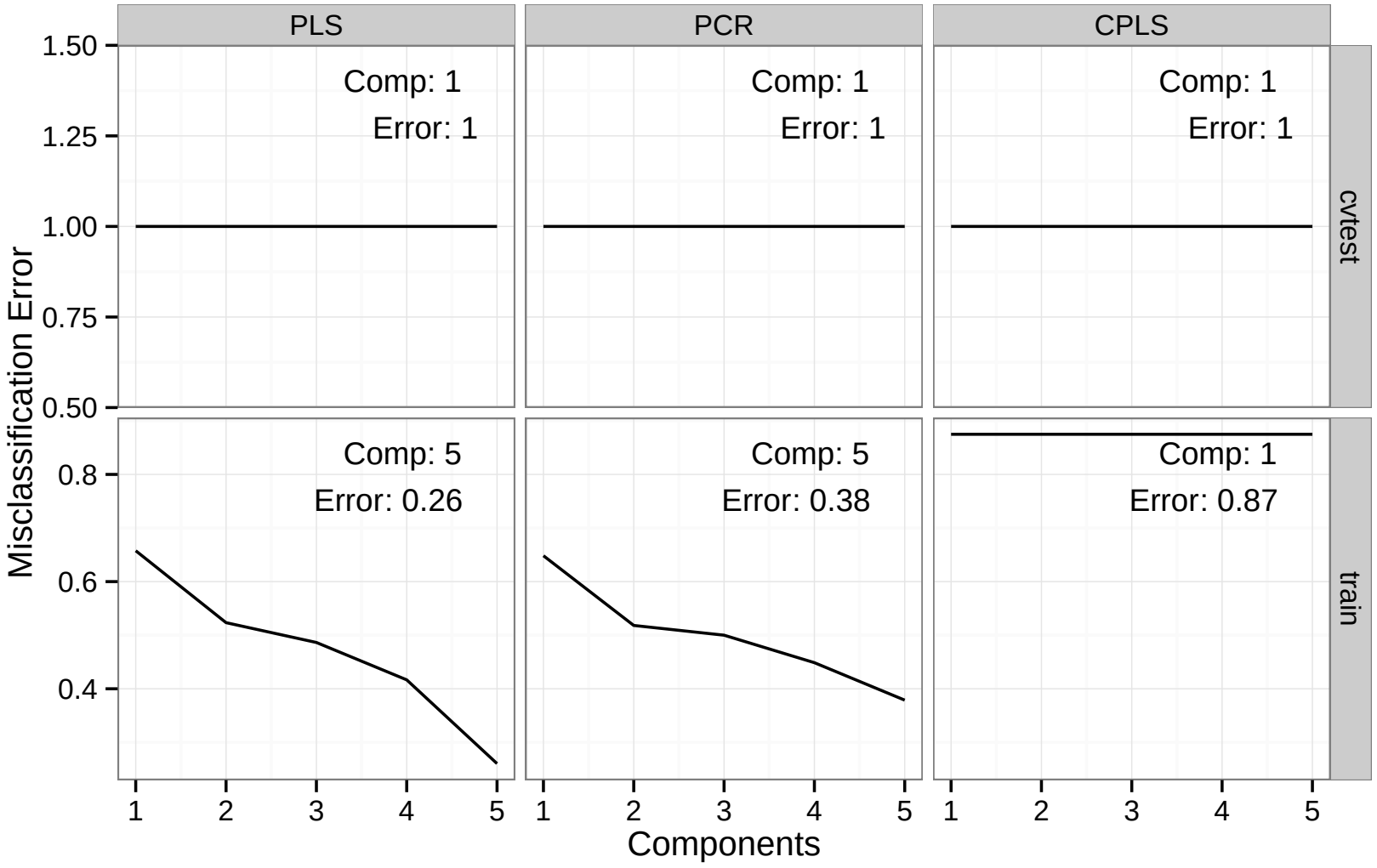
Scoreplot for CPPLS model



Classification with series averaged over Person-Event Combination

Training and Cross-validation Errors



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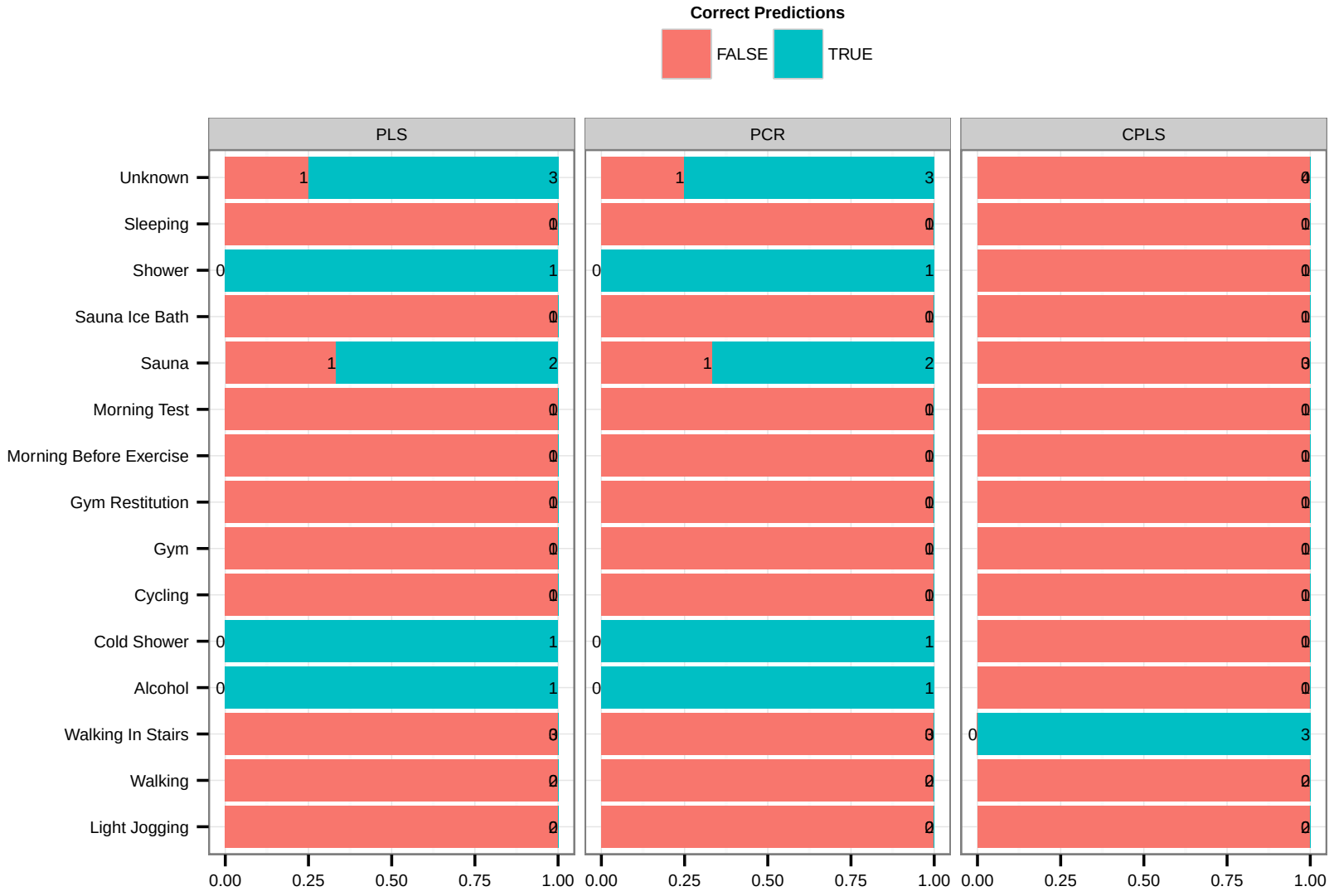

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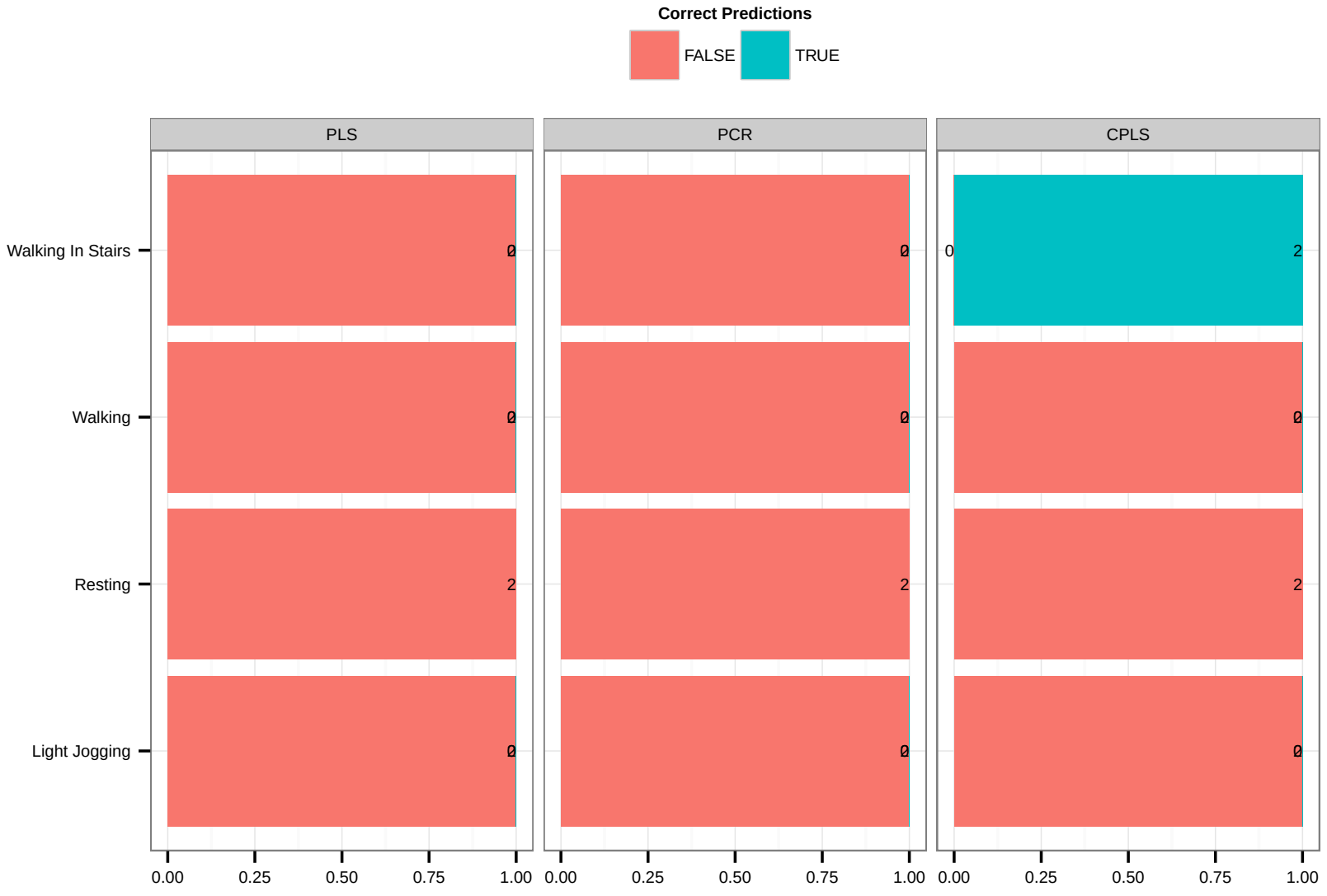

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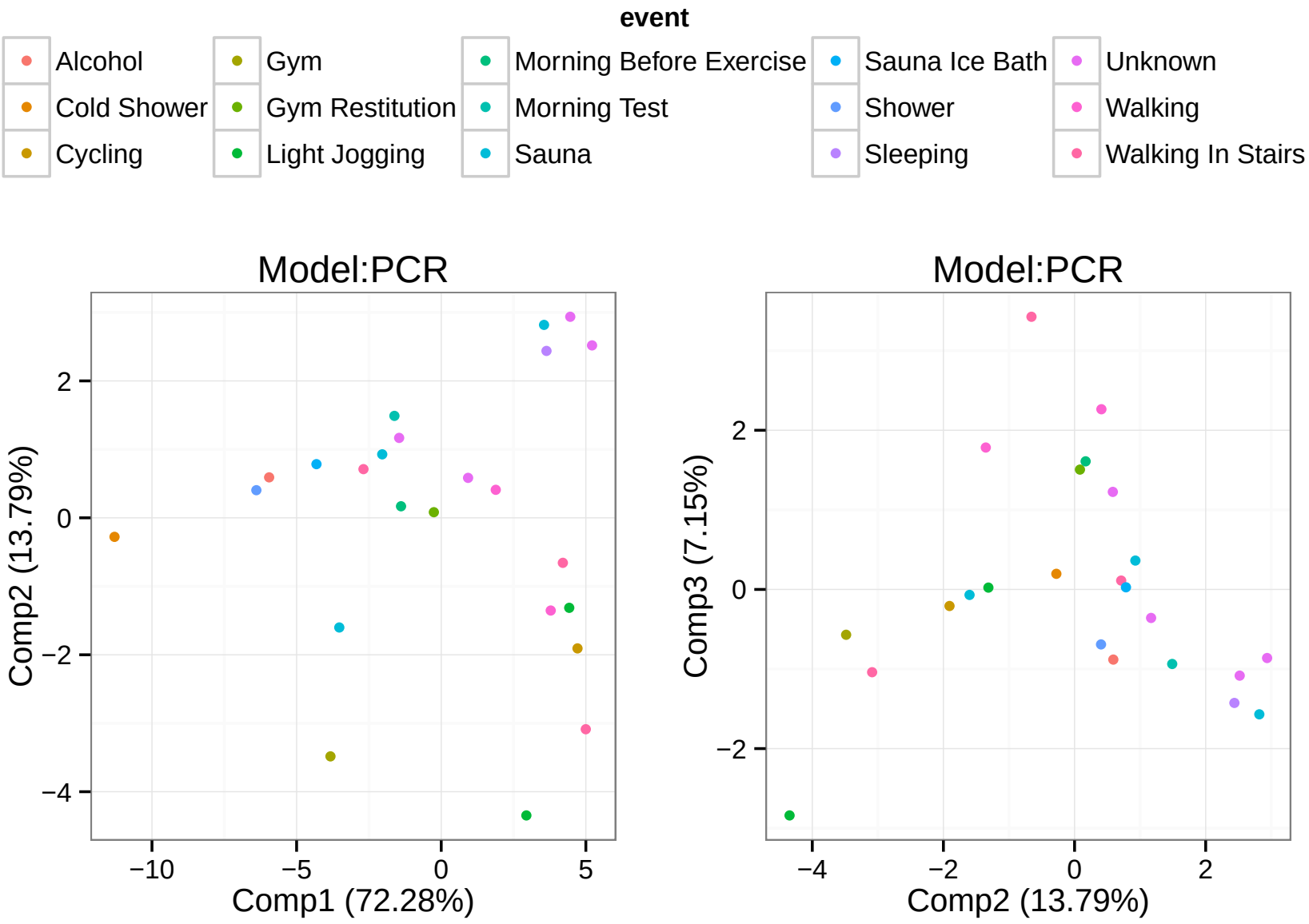
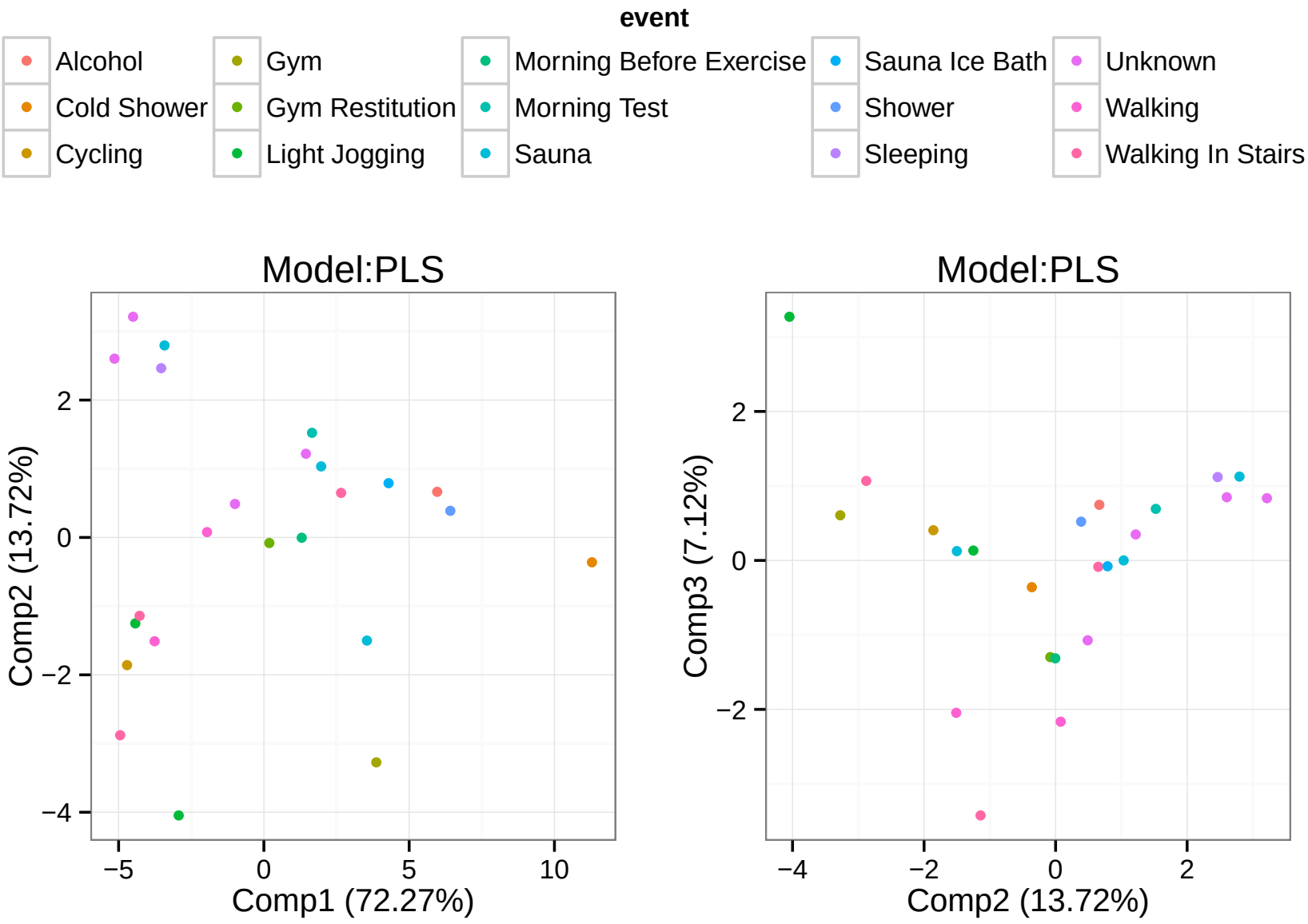
Scoreplot for PCR model



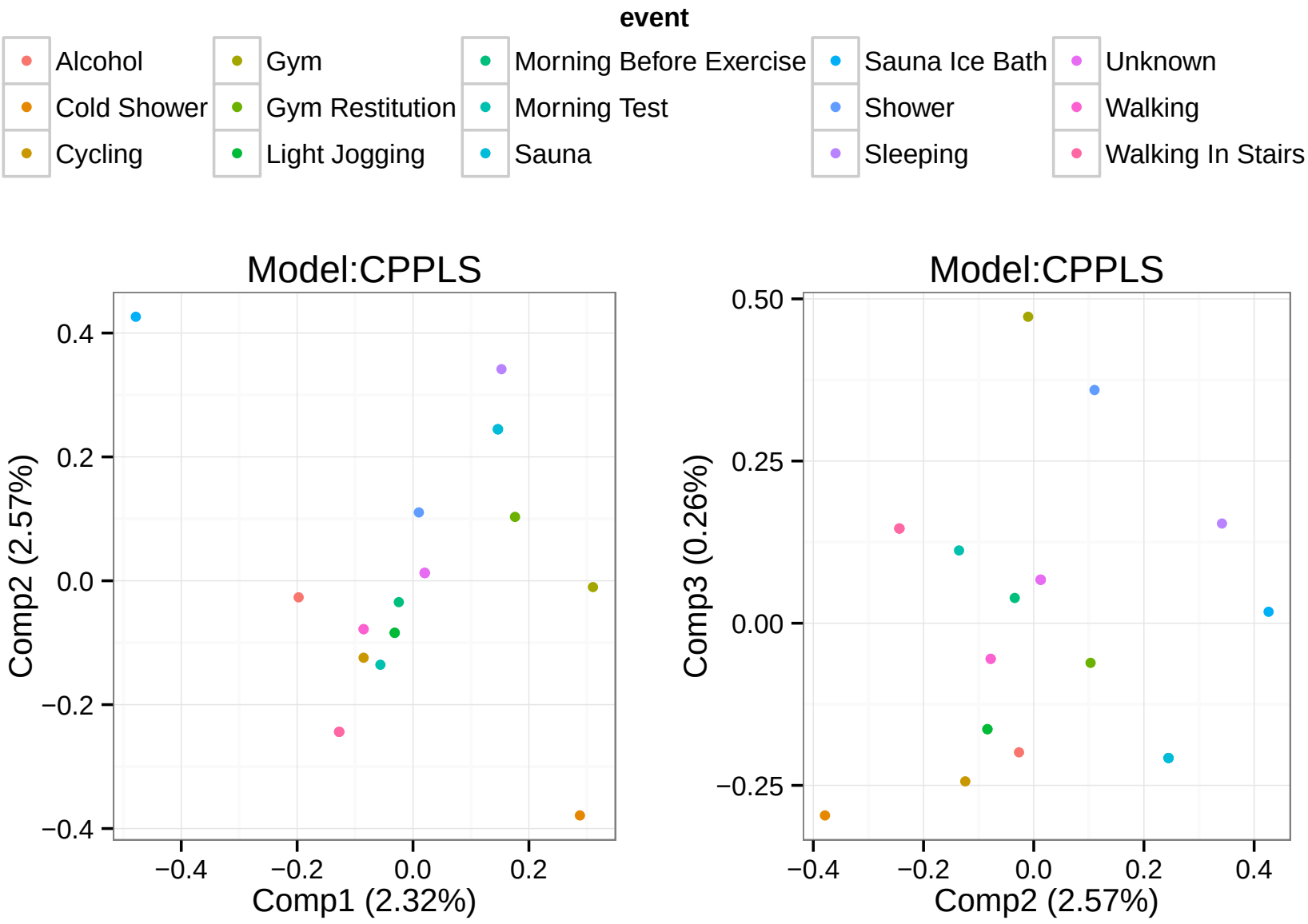
Plotting Scores

Scoreplot for PLS model



Plotting Scores

Scoreplot for CPPLS model



Some Comparison

Misclassification Errors

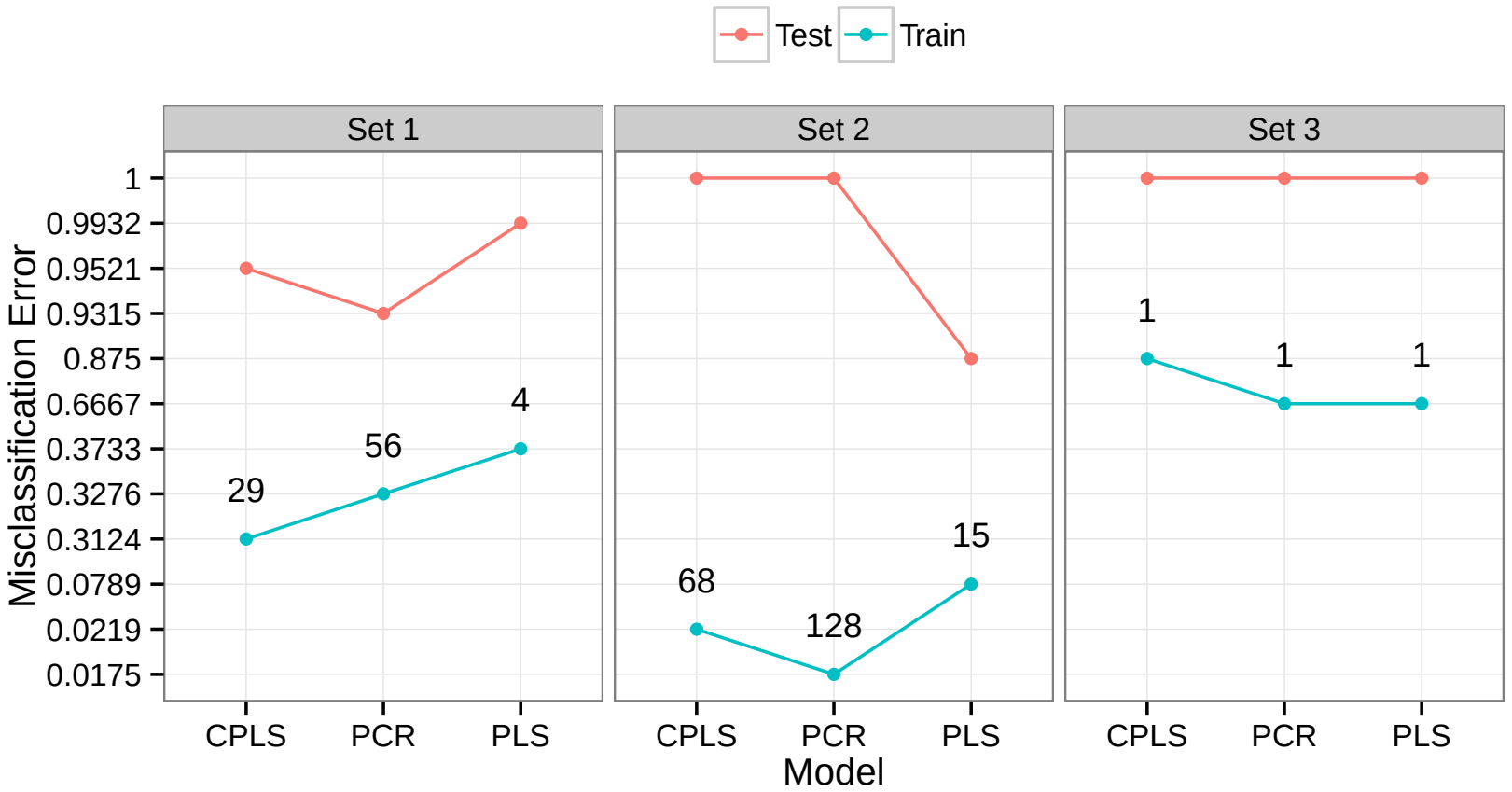


Figure: Training and Test Misclassification Error for all the three models. The LDA models were fitted with the scores obtained from three models with components (number above each points) needed to get minimum cross-validation error.

References

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