

# Dynamic Item- and Teststatistics A shiny GUI for test development

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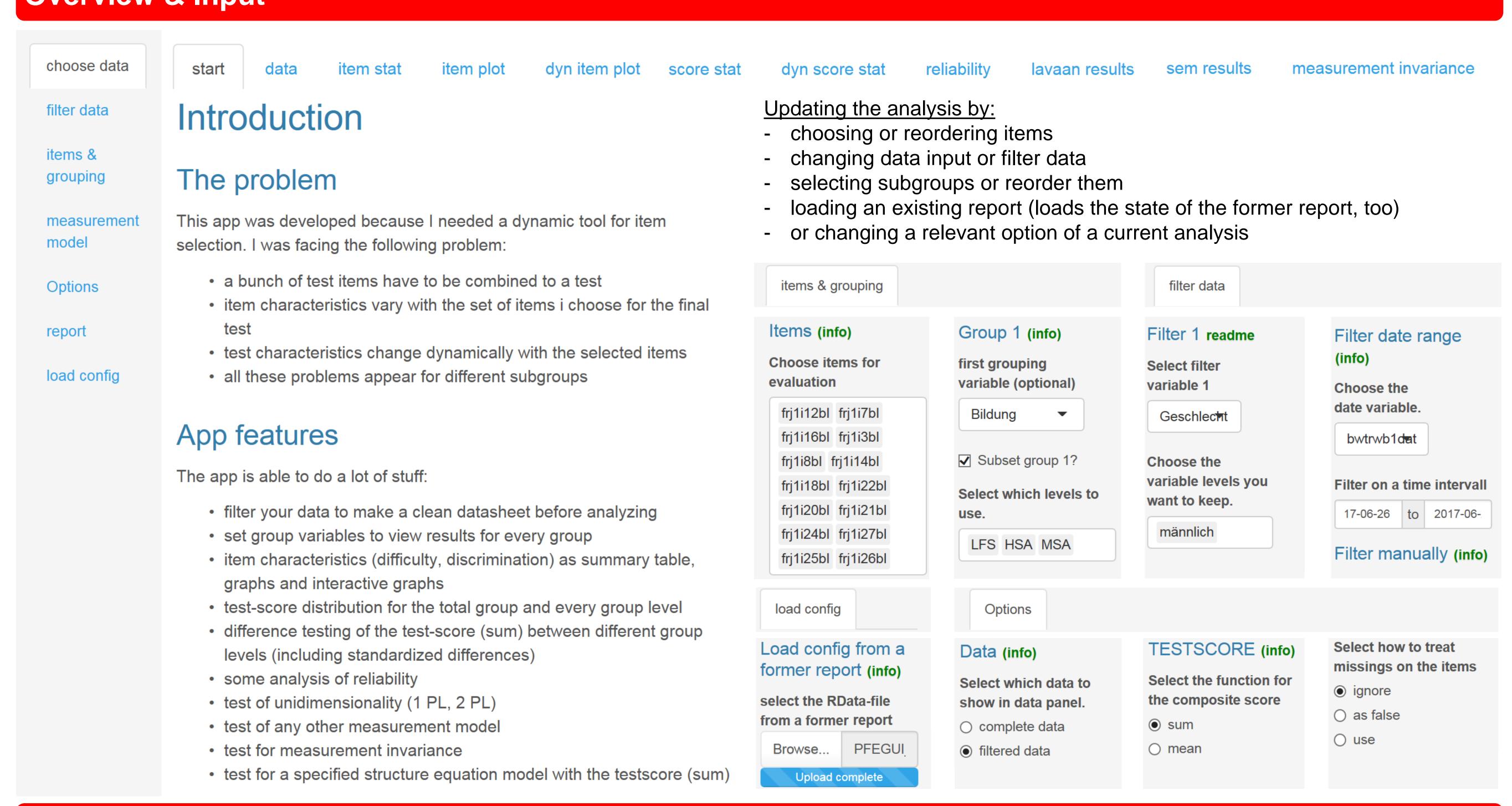
#### Requirements of the department

Over 70 different tests for psychological diagnostic (e.g. cognitive ability, language, occupational interests and more) are managed by the department and new tests are developed continually.

Standardized procedures may facilitate test development, thus a scientist can focus on project specific tasks and challenges.

Reproducibility and ease of use have to be core features of a statistic tool to meet different levels of experience with R and allow others to collaborate in a concrete test development procedure.

## **Overview & Input**

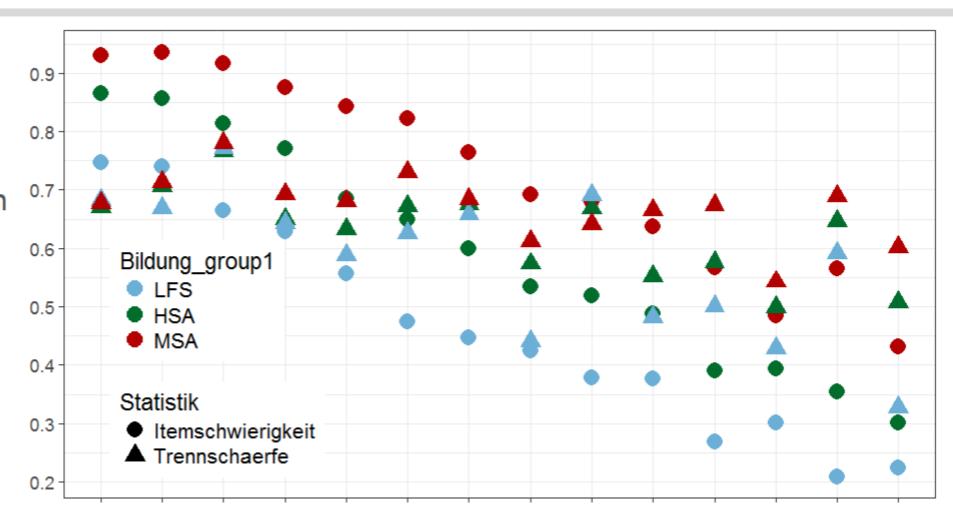


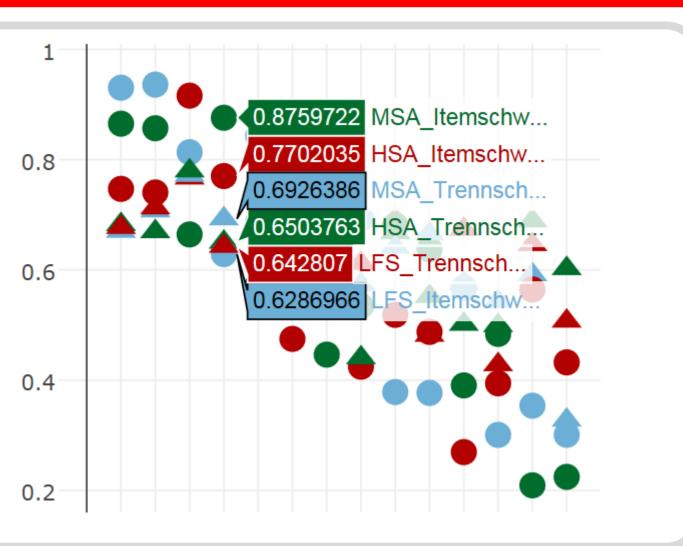
#### Output

### item plot

The panel item plot:

- shows a graph of discrimination and difficulty parameter for each selected item
- ... in the order of the selected items
- ... for each selected group (and group level)



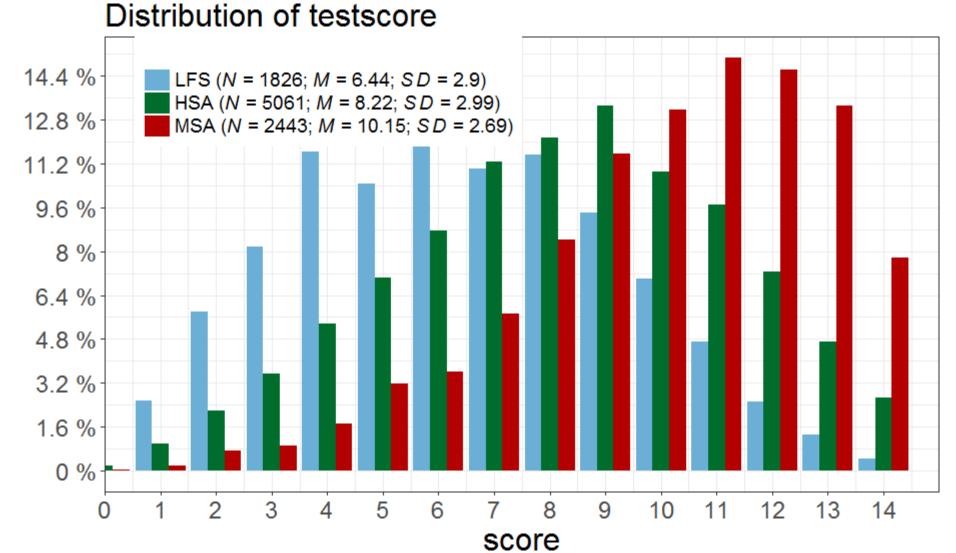


#### score stat

The panel score stat:

- shows the distribution of the testscore which is the sum of itemscores (ignoring missings)
- can be viewed as relative barplot or density
- shows the results of difference tests (t-tests)
- ... and a standardized mean difference between group levels

N1	N2 ♥	h1	h2	M1	M2	SD1 ♥	SD2 🏺	cohens_d =
1826	5061	0.167	0.462	6.441	8.221	2.904	2.987	0.600
5061	2443	0.462	0.223	8.221	10.146	2.987	2.691	0.665



#### reliability

The panel reliability:

- shows some parameter of reliability (unidimensional) and omega (4 factors))
- shows an indicator of model fit
- everything for each level of all specified groups

	group	N	Nitems	rmsea	alpha	G2	omegat
	LFS	1826	14	0.03	0.69	0.69	0.69
	HSA	5061	14	0.04	0.73	0.73	0.73
	MSA	2443	14	0.03	0.73	0.73	0.73

#### lavaan results

The panel lavaan results:

- shows the results of the applied measurement model
- uses the lavaan package and syntax
- changes directly, when items are added

#### measurement invariance

The panel measurement invariance:

- shows the result of measurement invariance tests
- uses the appropriate function of the semTools package

#### Model and general Additional analysis: report options. ✓ Apply MGCFA with Testing test of measurment Report (info) unidimensionality with invariance. (info) include item stat CFA. **Choose the group** include item plot ✓ Treat items as variable for MGCFA categorical. include score stat Bildung\_group1 ☐ Constrain all intercepts Geschlecht\_group2 include reliability or thresholds (categorical) to be include lavaan results equal. ✓ Apply SEM to the test include sem results score? Constrain all loadings include measurement to be equal. invariance

It is possible to include your analysis in a report (word-file). Just select which parts of the output panels you would like to see in the report. This capability allows reproducible research.

- 1. Select the results you want to include in the report
- Choose which group to include and their order

#### the report:

- consists of a word file (the report), the corresponding markdown file and a RData-file (with the data frame and an input-object) in a ziparchive
- can be replicated by executing the markdown file in R(Studio)
- incorporates all your settings from the PFE-GUI into the analysis
  can be adapted by changing the parameters in the input-object (see RData-file)