

QME PACKAGE

What is it? and Why are we doing it?

Wanted to make an R package that has a straight-forward, easy-to-use syntax for analyzing assessment data.

We also wanted to....

- Learn about function writing and R programming;
- Learn about using Github;
- Learn about the documentation process;
- Learning about coding style;
- Learn about how to do *all this* as a collaboration with others.



Installing the Package

The package is housed on GitHub so we can't do a typical package install. Instead, we use the `install_github()` function from the **devtools** library.

```
> library(devtools)  
  
> install_github("zief0002/QME")  
  
> library(QME)
```

Data and Format

To use the package we need a data frame of raw *or* keyed responses. The responses can either be numeric or character (i.e., letters).

The data frame should be formatted in the wide format, so that each row represents a student, and each column represents an item.

The data can also have an optional ID column as its first column (this is the default for using the QME package).

```
> head(math)
```

	id	item1	item2	item3	item4	item5	item6	item7	item8	item9	item10
1	1	A	A	B	C	C	C	B	C	A	C
2	2	E	B	C	D	B	C	A	D	C	A
3	3	D	A	C	E	B	C	C	B	C	A
4	4	D	E	E	D	B	C	E	B	C	A
5	5	A	B	B	C	B	C	E	E	B	B
6	6	A	B	C	D	B	B	A	B	D	A

Here is an example of non-keyed response data.

Keying Responses

If the response data has not been keyed, we will also need to supply a vector of the answers. This can be a data frame of the correct answers (in a single row) or can be inputted as a vector.

```
> math_key  
  
  item1 item2 item3 item4 item5 item6 item7 item8 item9 item10  
1   E     B     C     D     B     C     A     B     C     A
```

```
> math_key = c("E", "B", "C", "D", "B", "C", "A", "B", "C", "A")
```

odin_zeus() the QME Workhorse

The main arguments are
test= *data frame of responses*
key= *data frame (or vector) of correct answers*
id= *TRUE or FALSE (depending if your test data has a column of IDs)*

```
> oz = odin_zeus(test = math, key = math_key, id = TRUE)
```

`psycho_report()`

Obtaining a Test Report

The main arguments are

`x= an odin_zeus() object`

`output= the file name; default is "output.html" (stored in your working directory)`

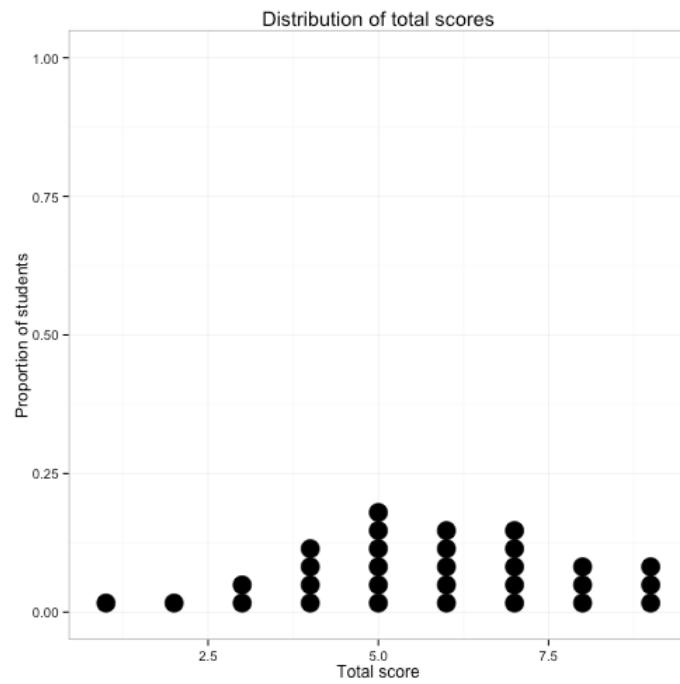
`open= TRUE (default) or FALSE`

```
> psycho_report(oz)
```

Number of items: 10

Number of examinees: 30

Total score information



	Value
Minimum Score	1.00
Maximum Score	9.00
Mean Score	5.70
Median Score	6.00
Standard Deviation	2.05
IQR	2.75
Skewness (G1)	-0.26
Kurtosis (G2)	-0.31

Reliability

Estimate 95% LL 95% UL SEM

	Estimate	95% LL	95% UL	SEM
Coefficient Alpha	0.57	0.30	0.77	1.34
Guttman's L2	0.61	0.36	0.79	1.28
Guttman's L4	0.54	0.24	0.75	1.40
Feldt-Gilmer	0.59	0.33	0.78	1.31
Feldt-Brennan	0.58	0.31	0.77	1.33

Alpha (If Item Deleted)

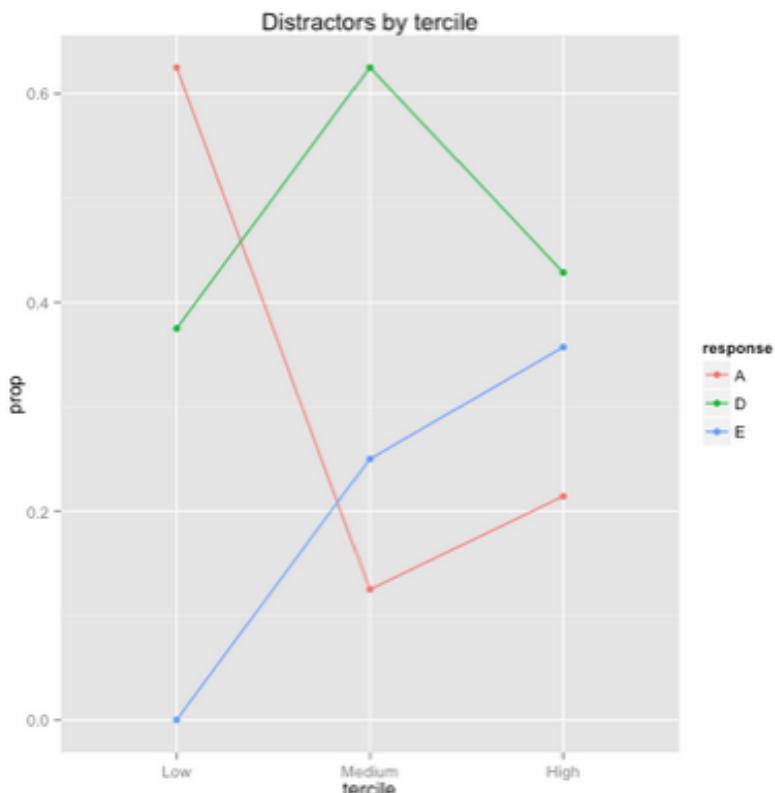
item1	0.54
item2	0.58
item3	0.53
item4	0.50
item5	0.57
item6	0.55
item7	0.50
item8	0.59
item9	0.57
item10	0.51

Item overview

Difficulty PBIS Corrected PBIS Missing (N) Missing (p)

item1	0.23	0.47	0.29	0	0.00
item2	0.27	0.35	0.14	0	0.00
item3	0.53	0.52	0.31	2	0.07
item4	0.63	0.61	0.42	0	0.00
item5	0.80	0.34	0.15	1	0.03
item6	0.80	0.42	0.24	0	0.00
item7	0.47	0.60	0.41	2	0.07
item8	0.37	0.32	0.08	1	0.03
item9	0.77	0.35	0.15	0	0.00
item10	0.83	0.55	0.41	0	0.00

Details for item1



Choice Key Proportions Response Discrimination

A	0	0.30	-0.20
D	0	0.47	-0.06
E	1	0.23	0.29

```
oz
|-- test_name
|-- test_level
  |-- descriptives
    |-- number_items
    |-- number_examinees
    |-- scores
    |-- mean_score
    |-- median_score
    |-- sd_score
    |-- iqr_score
    |-- min_score
    |-- max_score
    |-- skew_score
    |-- kurtosis_score
    |-- frequency_score
      |-- score
      |-- frequency
    |-- proportion_score
      |-- score
      |-- proportion
  |-- reliability
```

The `odin_zeus()` function stores all sorts of things that you have access to in a list. You access them using the `$` operator. You will need to include a `$` operator fro each level you want to reach.

```
oz
|-- item_level
  |-- distractor_analysis
  |-- item_stats
    |-- difficulty
    |-- point_biserial
    |-- corrected_pbis
  |-- missing
    |-- num_miss
    |-- prop_miss
  |-- del_alphas
    |-- item1
    |-- item2
    |-- ...
  |-- test
    |-- raw_test
      |-- id
      |-- item1
      |-- item2
      |-- ...
    |-- key
      |-- item1
      |-- item2
      |-- ...
  |-- keyed_test
    |-- id
    |-- item1
    |-- item2
    |-- ...
```

```
oz
|-- test_name
|-- test_level
|   |-- descriptives
|   |   |-- number_items
|   |   |-- number_examinees
|   |   |-- scores
|   |   |-- mean_score
|   |   |-- median_score
|   |   |-- sd_score
|   |   |-- iqr_score
|   |   |-- min_score
|   |   |-- max_score
|   |   |-- skew_score
|   |   |-- kurtosis_score
|   |   |-- frequency_score
|   |       |-- score
|   |       |-- frequency
|   |-- proportion_score
|       |-- score
|       |-- proportion
|-- reliability
```

Suppose you wanted to extract the examinees' median score.

```
> oz$test_level$descriptives$median_score
[1] 6
```

Future Goals

There is still a lot of functionality that we would like to add....

- Improved documentation (vignette, etc.)
- Easier usage with methods (some of this exists already...just not presented)
- Bug testing (test the package with different and more real-life data sets)
- IRT outputs (???)
- Better use with survey data (where there is no "key")