

# Package ‘PsyToolkit’

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**Title** Analysis Tools for 'PsyToolkit'

**Description** Analyses and reports questionnaire and experiment data exported from 'PsyToolkit'. The package reads downloaded study folders, parses questionnaire structure, optionally merges demographic exports from CloudResearch or Prolific, and produces summary overviews of responses and completion times. It also provides helper functions to extract and aggregate experiment measures and survey variables, and to export results to spreadsheet files for further analysis and archiving. See Stoet (2017) <[doi:10.1177/0098628316677643](https://doi.org/10.1177/0098628316677643)> for the 'PsyToolkit' platform.

**License** MIT + file LICENSE

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PsyToolkit-package      *PsyToolkit: Analysis Tools for PsyToolkit Data*

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## Description

Functions to read, summarise, and export PsyToolkit questionnaire and experiment data.

## Details

### Typical workflow

1. Download PsyToolkit data from your PsyToolkit account (a zip file).
2. Create your R working directory, and within that, a folder data.
3. Extract the downloaded PsyToolkit zip file into your new folder data.
4. Read the data from the folder with [psytkReadData](#).
5. Summarise the data with [psytkReport](#).
6. Process data with other functions, such as [psytkExtractFromExperiment](#).
7. Export data with [psytkExport](#).

### Main functions

- [psytkReadData](#): Read PsyToolkit data into an R object.
- [psytkReport](#): Print a summary report.
- [psytkExport](#): Export data to an Excel workbook.
- [psytkTable](#): Print formatted tables.
- [psytkExtractFromExperiment](#): Extract data for detailed processing.
- [psytkExtractTail](#): Extract last line from experiment files.

### Other functions

- [psytkParseSurvey](#)
- [psytkReadTable](#)
- [psytkRemoveData](#)
- [psytkQ](#)
- [psytkExtractCount](#)
- [psytkExtractNum](#)

- [psytkExtractPerc](#)
- [psytkExtractTail](#)
- [psytkExtractFromExperiment](#)

### Example

A small example object is included for documentation examples: `data(psytkDemo)`. This is not required for normal usage.

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psytkDemo

*Example PsyToolkit Data Object*

---

### Description

A small example object illustrating the structure returned by `psytkReadData()`.

### Format

An object used in examples.

### Examples

```
data(psytkDemo)
str(psytkDemo, max.level = 1)
```

---

psytkExport

*psytkExport*

---

### Description

Exports most of the loaded PsyToolkit data to Excel file.

### Usage

```
psytkExport(surveydata , file = "exported_data.xlsx" , labels = FALSE ,
orderByType = FALSE )
```

### Arguments

surveydata	The PsyToolkit survey data object
file	If no filename provided, default <code>exported_data.xlsx</code> will be used
labels	Not yet implemented
orderByType	Order output by question type instead of order of survey

**Value**

No returned value.

**Examples**

```
## Real workflow (requires your own PsyToolkit data files in myfolder)
## Not run:
psytkDemo = psytkReadData( "myfolder" )

## End(Not run)
## runnable example for CRAN checks:
data( psytkDemo ) # or for runnable example

tmp_out_file = tempfile(fileext=".xlsx")

psytkExport( psytkDemo , tmp_out_file )

unlink( tmp_out_file)
```

---

psytkExtractCount	<i>psytkExtractCount</i>
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---

**Description**

Find out how for each participant how many cases of condition exist

**Usage**

```
psytkExtractCount(data , names , conditions)
```

**Arguments**

data	data object
names	names of conditions
conditions	The actual conditions as logical vectors

**Value**

A dataframe with for each condition a vector with data for each participant/file.

**Examples**

```
## Not run:
d = psytkReadData("data")

stroopCorrect = d$expData.stroopForR["V7"] == 1 ## correct key pressed
stroopWrong   = d$expData.stroopForR["V7"] == 2 ## wrong key pressed
stroopError   = d$expData.stroopForR["V7"] != 1 ## wrong key pressed
```

```

                                ## or no key at all (timeout)
stroopSlow = d$expData.stroopForR["V7"] == 3 ## timeout
con        = d$expData.stroopForR["V4"] == 1
inc        = d$expData.stroopForR["V4"] == 0
realdata   = d$expData.stroopForR["V1"] == "real"

conditionCongruent = con
conditionIncongruent = inc

basicSelection = stroopCorrect & realdata

subsel = realdata

stroopTrials = psytkExtractCount(
  data = d$expData.stroopForR ,
  names = c("congruent", "incongruent", "all"),
  conditions = cbind( conditionCongruent & subsel ,
                      conditionIncongruent & subsel , realdata & subsel ))

## End(Not run)

```

---

```

psytkExtractFromExperiment
      psytkExtractFromExperiment

```

---

## Description

Extract the data of one participant from one experiment in the PsyToolkit data object

## Usage

```
psytkExtractFromExperiment(dataset , expname , id = 1 , removeID = TRUE)
```

## Arguments

dataset	The name of the PsyToolkit survey data
expname	The name of the experiment
id	The id, can either be numerical or UUID
removeID	Returned data does not contain participant IDs

## Value

A data frame with the participant's data.

**Examples**

```
## Not run:
## imagine your data contains an experiment named "Stroop"
## imagine the Stroop data have as 5th column the reaction time
## this is a way to calculate the mean RT of each participant

d = psytkReadData("data")
meanRTs = numeric( d$n )
for ( i in d$IDcount ){
  tmpdata = psytkExtractFromExperiment( d , "Stroop" , id = i )
  meanRTs = mean( tmpdata[,5] )
}

## End(Not run)
```

---

psytkExtractNum

*psytkExtractNum*


---

**Description**

Apply function to data each participants' experiment data.

**Usage**

```
psytkExtractNum(data , dependent , names , conditions , f = mean)
```

**Arguments**

data	The experiment data frame
dependent	The column in the experiment data of interest
names	The names of the conditions
conditions	For each name of a condition a vector of logical selecting data
f	A function such as mean (default), median, min, max

**Value**

Returns a dataframe with one column for each condition.

**Examples**

```
## Not run:
d = psytkReadData("data")
stroopCorrect = d$expData.stroopForR[,"V7"] == 1 ## correct key pressed
stroopWrong   = d$expData.stroopForR[,"V7"] == 2 ## wrong key pressed
stroopError   = d$expData.stroopForR[,"V7"] != 1 ## wrong key pressed or
               ## no key at all (timeout)
stroopSlow    = d$expData.stroopForR[,"V7"] == 3 ## timeout
con           = d$expData.stroopForR[,"V4"] == 1
```

```

inc          = d$expData.stroopForR["V4"] == 0
realdata     = d$expData.stroopForR["V1"] == "real"

conditionCongruent = con
conditionIncongruent = inc

basicSelection = stroopCorrect & realdata

## the psytkExtractNum function is part of the PsyToolkit library. It
## extracts from the experiment data for each participant one row. So
## you end with a row of RT for the congruent and incongruent
## condition; you can later use this for the t test.

stroopRT = psytkExtractNum(
  data = d$expData.stroopForR ,
  dependent = 10 ,
  names = c("congruent", "incongruent"),
  conditions = cbind( conditionCongruent & basicSelection ,
                      conditionIncongruent & basicSelection ))

## End(Not run)

```

---

psytkExtractPerc      *psytkExtractPerc*

---

## Description

For each participant, calculate a percentage based on conditions.

## Usage

```
psytkExtractPerc(data , dependent , names , conditions , f = mean)
```

## Arguments

data	The experiment data frame
dependent	The column in the experiment data of interest
names	The names of the conditions
conditions	For each name of a condition a vector of logical selecting data
f	A function such as mean (default), median, min, max

## Value

A vector the length of survey IDs in your dataset.

**Examples**

```

## Not run:
d = psytkReadData("data")
stroopCorrect = d$expData.stroopForR[, "V7"] == 1 ## correct key pressed
stroopWrong   = d$expData.stroopForR[, "V7"] == 2 ## wrong key pressed
stroopError   = d$expData.stroopForR[, "V7"] != 1 ## wrong key pressed
              ## or no key at all (timeout)

stroopSlow    = d$expData.stroopForR[, "V7"] == 3 ## timeout
con           = d$expData.stroopForR[, "V4"] == 1
inc           = d$expData.stroopForR[, "V4"] == 0
realdata      = d$expData.stroopForR[, "V1"] == "real"

conditionCongruent = con
conditionIncongruent = inc

basicSelection = stroopCorrect & realdata

## the psytkExtractNum function is part of the PsyToolkit library. It
## extracts from the experiment data for each participant one row. So
## you end with a row of RT for the congruent and incongruent
## condition; you can later use this for the t test.

stroopRT = psytkExtractNum( data = d$expData.stroopForR ,
                           dependent = 10 ,
                           names = c("congruent", "incongruent"),
                           conditions = cbind( conditionCongruent & basicSelection ,
                                                conditionIncongruent & basicSelection ) )

## the psytkExtractPerc function is part of the PsyToolkit library.

## It extracts from the experiment data for each participant one
## row. It calculates the Percentage of Errors (PE) for each
## participant. This is useful for two reasons: 1) You can use it to
## calculate the Stroop effect in error rates. 2) You can use it to
## find out if some participants performed extremely poorly (for
## example at chance level)

stroopPE = psytkExtractPerc(
  data = d$expData.stroopForR ,
  dependent = !stroopCorrect ,
  names = c("congruent", "incongruent"),
  conditions = cbind( conditionCongruent & realdata ,
                     conditionIncongruent & realdata ) )

## End(Not run)

```

**Description**

Extracts a value from each participants experiment data

**Usage**

```
psytkExtractTail(data , dependent)
```

**Arguments**

data	The experiment data (not the survey object)
dependent	The column of the table you are interested in.

**Value**

A vector of values as long as there are files/participants/sessions.

**Examples**

```
## Not run:
## assume there is an experiment Stroop and the 5th column of this file
## is the reaction time

d = psytkReadData("data")
myExpData = d$expData.Stroop
speed = psytkExtractTail( myExpData , 5 )

## End(Not run)
```

---

psytkParseSurvey      *psytkParseSurvey*

---

**Description**

Parses the survey.txt file in your data file. Rarely needed on its own. Is used by psytkReadData

**Usage**

```
psytkParseSurvey(datadir = NA , surveyfilename = NA)
```

**Arguments**

datadir	The folder where you extracted your PsyToolkit data zip file
surveyfilename	The name of the survey if not survey.txt

**Value**

Returns a survey objects giving data about questions and items in it.

**Examples**

```
## Not run:  
mySurvey = psytkParseSurvey( "data" )  
  
## End(Not run)
```

---

psytkQ	<i>psytkQ</i>
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---

**Description**

Overview of questionnaire structure

**Usage**

```
psytkQ( data )
```

**Arguments**

data            The survey data object

**Value**

Structure of the survey

**Examples**

```
## Not run:  
d = psytkReadData ( "myfolder" )  
psytkQ(d)  
  
## End(Not run)
```

---

psytkReadData	<i>psytkReadData</i>
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---

**Description**

Load PsyToolkit raw data.

**Usage**

```
psytkReadData(surveyOrDir , psytkAllowRepeatExp = TRUE , verbose = TRUE)
```

**Arguments**

surveyOrDir      The name of the folder where you unzipped your PsyToolkit downloaded data file

psytkAllowRepeatExp      If more than one version of the same experiment available, the last will be used

verbose            With TRUE you get detailed information about each datafile.

**Details**

This is the start of any workflow for working with PsyToolkit data.

**Value**

Returns on object holding all the data of the survey, including experiment data if available.

**Examples**

```
## Not run:
d = psytkReadData("myfolder")

## End(Not run)
```

---

psytkReadTable      *psytkReadTable*

---

**Description**

Read any textfile containing data. Idea for textfiles with unequal row lengths.

**Usage**

```
psytkReadTable(filename)
```

**Arguments**

filename            The name of the text file to be rad

**Details**

The benefit of this specific function over read.table() is that it can read datafiles with really different numbers of items per row easily. That can be helpful for reading in experiment data. This function is rarely needed for end users.

**Value**

A data frame

**Examples**

```
## Not run:  
z = psytkReadTable( "mydata.txt" )  
  
## End(Not run)
```

---

psytkRemoveData	<i>psytkRemoveData</i>
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---

**Description**

Allows you to remove participant datafiles from a PsyToolkit survey data object.

**Usage**

```
psytkRemoveData(psytkSurveyData , selection)
```

**Arguments**

psytkSurveyData	The object holding the PsyToolkit survey data
selection	A logical vector as long as the number of participants/files used

**Value**

Returns a new object without the removed data. This includes removal from the participant data

**Examples**

```
## Not run:  
## example of removing participant with ID number lower than 10 from all data  
  
dataset1 = psytkReadData("data")  
selection = rep( T , dataset$n )  
selection[ d$IDcount < 10 ] = F  
dataset2 = psytkRemoveData( d , selection )  
  
## End(Not run)
```

---

psytkReport	<i>Create a Summary Report for PsyToolkit Data object</i>
-------------	---

---

## Description

Creates a textual summary report for PsyToolkit questionnaire data.

## Usage

```
psytkReport(psytkSurveyData, textbox = FALSE, question = TRUE , print =  
TRUE )
```

## Arguments

psytkSurveyData	A PsyToolkit survey data object (typically returned by <code>psytkReadData(foldername)</code> ).
textbox	Logical; whether to include summaries for textbox items. Optional, because these can sometimes be long.
question	Logical; whether to include question text from q: lines when available.
print	Logical; whether or not the report is shown in terminal.

## Value

Returns a report object, which can be shown with function `print`.

## Examples

```
## Real workflow (requires your own PsyToolkit data files in myfolder)  
## Not run:  
d = psytkReadData( "myfolder" )  
  
## End(Not run)  
## runnable example for CRAN checks:  
data(psytkDemo) # or for runnable example  
  
myReport = psytkReport( psytkDemo ) # this will show the report in the terminal  
print( myReport ) # you can print the report later as well
```

psytkTable

*psytkTable*

---

**Description**

Present R data frame or R matrix in a nice table for R terminal output

**Usage**

```
psytkTable(x, header = NULL , align = "L" , padding=2 , wrap = 20)
```

**Arguments**

x	A data frame or matrix with some data.
header	A header above the content of the table.
align	L, C, or R for left, center, or right alignment for all or vector of each column
padding	Spacing between columns, default is 2
wrap	Wrap cells if they have more than 20 characters

**Value**

This function simply outputs to terminal screen.

**Examples**

```
## Not run:  
x = data.frame( items=1:3, names=c("John", "Claudia", "Mel") )  
psytkTable( x , header=TRUE )  
  
## End(Not run)
```

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