# Package 'psyverse' 

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Type Package
Title Decentralized Unequivocality in Psychological Science
Version 0.2.6
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License GPL (>=3)
Description The constructs used to study the human psychology have many definitions and corresponding instructions for eliciting and coding qualitative data pertaining to constructs' content and for measuring the constructs. This plethora of definitions and instructions necessitates unequivocal reference to specific definitions and instructions in empirical and secondary research. This package implements a human- and machine-readable standard for specifying construct definitions and instructions for measurement and qualitative research based on 'YAML'. This standard facilitates systematic unequivocal reference to specific construct definitions and corresponding instructions in a decentralized manner (i.e. without requiring central curation; Peters (2020)
[doi:10.31234/osf.io/xebhn](doi:10.31234/osf.io/xebhn)).
BugReports https://gitlab.com/r-packages/psyverse/-/issues
URL https://psyverse.one

## Encoding UTF-8

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apply_graph_theme Apply multiple DiagrammeR global graph attributes

## Description

Apply multiple DiagrammeR global graph attributes

## Usage

apply_graph_theme(dctGraph, ...)

## Arguments

dctGraph The DiagrammeR::DiagrammeR graph to apply the attributes to.
One or more character vectors of length three, where the first element is the attribute, the second the value, and the third, the attribute type (graph, node, or edge).

## Value

The DiagrammeR::DiagrammeR graph.

## Examples

```
exampleSpec <-
    system.file("inst",
                "extdata",
                    "example_dct_spec_1.dct",
                    package="psyverse");
parsedSpecs <- load_dct_specs(exampleSpec);
dctGraph <- parsedSpecs$output$basic_graph;
dctGraph <- apply_graph_theme(dctGraph,
                        c("color", "#0000AA", "node"),
                        c("fillcolor", "#00FFFF", "node"));
```

base30toNumeric Conversion between base10 and base30 \& base36

## Description

The conversion functions from base10 to base30 are used by the generate_id() functions; the base36 functions are just left here for convenience.

## Usage

base30toNumeric(x)
base36toNumeric(x)
numericToBase30(x)
numericToBase36(x)

## Arguments

x
The vector to convert (numeric for the numericTo functions, character for the base30to and base36to funtions).

## Details

The symbols to represent the 'base 30 ' system are the $0-9$ followed by the alphabet without vowels but including the $y$. This vector is available as base30.

## Value

The converted vector (numeric for the base30to and base36to funtions, character for the numericTo functions).

## Examples

numericToBase30(654321);
base30toNumeric(numericToBase30(654321));

```
cat0 Concatenate to screen without spaces
```


## Description

The cat 0 function is to cat what paste 0 is to paste; it simply makes concatenating many strings without a separator easier.

## Usage

cat0(..., sep = "")

## Arguments

... The character vector(s) to print; passed to cat.
sep The separator to pass to cat, of course, "" by default.

## Value

Nothing (invisible NULL, like cat).

## Examples

cat0("The first variable is '", names(mtcars)[1], "'.");
dct_from_spreadsheet Import a DCT specification from a spreadsheet

## Description

This function reads a spreadsheet (from a Google sheet URL or a local file in .xlsx, .csv, or . sav format) and imports the DCT specifications in it.

## Usage

```
dct_from_spreadsheet(
        x,
        path = NULL,
        sheet = NULL,
        localBackup = NULL,
        exportGoogleSheet = TRUE,
        xlsxPkg = c("rw_xl", "openxlsx", "XLConnect"),
        preventOverwriting = psyverse::opts$get("preventOverwriting"),
        encoding = psyverse::opts$get("encoding"),
        silent = psyverse::opts$get("silent")
)
```


## Arguments

x
The URL or path to a file.
path The path to save the DCT specifications.
sheet Optionally, the name(s) of the worksheet(s) to select.
localBackup If not NULL, a valid filename to write a local backup to.
exportGoogleSheet
If $x$ is a URL to a Google Sheet, instead of using the googlesheets4 package to download the data, by passing exportGoogleSheet=TRUE, an export link will be produced and the data will be downloaded as Excel spreadsheet.
xlsxPkg Which package to use to work with Excel spreadsheets.
preventOverwriting
Whether to prevent overwriting.
encoding The encoding to use.
silent Whether to be silent or chatty.

## Value

Invisibly, an object with the worksheets and the DCT objects.
dct_object Create a DCT object

## Description

Create a DCT object

## Usage

```
dct_object(
    version = as.character(utils::packageVersion("psyverse")),
    id = NULL,
    prefix = paste(sample(letters, 4), collapse = ""),
    label = "",
    date = as.character(Sys.Date()),
    dct_version = "1",
    ancestry = "",
    retires = "",
    definition = "",
    measure_dev = "",
    measure_code = "",
    aspect_dev = "",
    aspect_code = "",
    comments = "",
    rel = NULL
)
```


## Arguments

| version | The version of the DCT specification format (normally the version of the psyverse <br> package). <br> The Unique Construct Identifier (UCID); if not provided, this is created using <br> the prefix. |
| :--- | :--- |
| id | The prefix to use to construct the Unique Construct Identifier (UCID); ignored i <br> id is provided. |
| prefix | The human-readable label for the construct. |
| label | The date at which the construct was created. |
| date | The version of the DCT specification. This can optionally be used to manage <br> consecutive DCT versions. |
| dct_version |  |
| ancestry | The DCT specification or specifications that this DCT was based on. |
| retires | The DCT specification or specifications that this DCT renders obsolete (note <br> that this doesn't mean anything in itself; psyverse does not enforce this auto- <br> matically, nor does PsyCoRe, without configuration). |
| definition | The definition of the construct. This has to be comprehensive, detailed, accurate, <br> and clearly delineate the relevant aspects of the human psychology. |
| measure_dev | Instructions for developing measurement instruments that measure this con- <br> struct. |
| measure_code | Instructions for coding measurement instruments (e.g. in systematic reviews) as <br> measurement instruments that measure this construct. Note that explicitly defin- <br> ing boundary conditions often helps, for example by explaining the features that |
| coders should look for to distinguish this construct from closely related con- |  |
| structs (ideally linking to those other constructs using the dct:UCID notations). |  |


| aspect_dev | Instructions for eliciting construct content. Note that this is not sensible for all <br> constructs; some may be defined at a very general level, rendering their content <br> insufficiently specific to discuss or describe. |
| :--- | :--- |
| aspect_code | Instructions for coding construct content (i.e. aspects). Note that explicitly <br> defining boundary conditions often helps, for example by explaining the fea- <br> tures that coders should look for to distinguish this construct from closely re- <br> lated constructs (ideally linking to those other constructs using the dct:UCID <br> notations). |
| comments | Any additional comments. |
| rel | Relationships with other constructs. |

## Value

The DCT object.

## Examples

```
exampleDCT <-
    psyverse::dct_object(
        prefix = "exampleConstruct",
        label = "An example construct",
        definition = "The definition goes here",
        measure_dev = "Here you can explain how to measure the construct"
    );
```

dct_object_to_html Create an HTML fragment showing a DCT object

## Description

Create an HTML fragment showing a DCT object

## Usage

```
dct_object_to_html(
    dctObject,
    headingLevel = 3,
    hyperlink_UCIDs = TRUE,
    collapseButtons = TRUE,
    urlPrefix = "#",
    sortDecreasing = FALSE
)
```


## Arguments

```
    dctObject The DCT object
    headingLevel The level of the heading in the Markdown output that is produces.
    hyperlink_UCIDs
                            Whether to create hyperlinks to UCIDs.
    collapseButtons
                    Whether to include buttons to show/hide the definition and instructions.
    urlPrefix The prefix to insert before the URL in the produced hyperlink. The default, "#",
            results in a link to an anchor (an HTML a element) on the current page.
    sortDecreasing Whether to sort the constructs in decreasing order (TRUE), in increasing order
    (FALSE), or not at all (NULL).
```


## Value

A character vector.

## Examples

```
exampleDCT <-
    psyverse::dct_object(
        prefix = "exampleConstruct",
        label = "An example construct",
        definition = "The definition goes here",
        measure_dev = "Here you can explain how to measure the construct"
    );
### Only run this in an interactive R session,
### as it shows the HTML in the viewer.
if (interactive()) {
    dct_object_to_html(exampleDCT);
}
```

dct_object_to_yaml Convert a DCT object to YAML

## Description

## Convert a DCT object to YAML

## Usage

dct_object_to_yaml(dctObject)

## Arguments

dctObject The DCT object

## Value

A character vector.

```
dct_sheet_to_dct Create a DCT object from a DCT sheet
```


## Description

Create a DCT object from a DCT sheet

## Usage

dct_sheet_to_dct(dct_sheet)

## Arguments

dct_sheet A dataframe containing a DCT specification.

## Value

A DCT created by dct_object().

```
generate_construct_overview
Generate construct overviews and instruction overviews
```


## Description

These functions use a DCT specification to generate a construct overview or an instruction overview.

```
Usage
    generate_construct_overview(
        dctSpec,
        include = c("definition", "measure_dev", "measure_code", "manipulate_dev",
            "manipulate_code", "aspect_dev", "aspect_code", "rel"),
        hideByDefault = NULL,
        divClass = "btn btn-secondary",
        headingLevel = 3,
        collapseButtons = TRUE,
        hyperlink_UCIDs = TRUE,
        HTMLoutput = FALSE,
        urlPrefix = "#",
        sortDecreasing = FALSE
    )
    generate_definitions_overview(
        dctSpecDf,
        headingLevel = 3,
```

```
    hyperlink_UCIDs = "Markdown",
    urlPrefix = "#",
    sortDecreasing = FALSE
)
generate_instruction_overview(
    dctSpecDf,
    type,
    headingLevel = 3,
    hyperlink_UCIDs = "Markdown",
    urlPrefix = "#",
    sortDecreasing = FALSE
)
```


## Arguments

dctSpec The DCT specification, as resulting from a call to load_dct_specs() or load_dct_dir().
include Which elements to include in the construct overview.
hideByDefault Which elements to hide by default.
divClass The class of the button to collapse/expand sections.
headingLevel The level of the heading in the Markdown output that is produces.
collapseButtons
Whether to include buttons to show/hide the definition and instructions.
hyperlink_UCIDs
Whether to create hyperlinks to UCIDs.
HTMLoutput Whether to output to Markdown (FALSE) or HTML (TRUE).
urlPrefix The prefix to insert before the URL in the produced hyperlink. The default, "\#", results in a link to an anchor (an HTML a element) on the current page.
sortDecreasing Whether to sort the constructs in decreasing order (TRUE), in increasing order (FALSE), or not at all (NULL).
dctSpecDf The DCT specification dataframer, as produced by a call to load_dct_specs() or load_dct_dir(), and stored within the resulting object.
type For instruction overviews, the type of instruction to generate can be specified: must be one of "measure_dev", "measure_code", "manipulate_dev", "manipulate_code", "aspect_dev", or "aspect_code".

Value
A character string with the overview.

## Examples

```
exampleDCT <-
    psyverse::dct_object(
        prefix = "exampleConstruct",
        label = "An example construct",
```

```
        definition = "The definition goes here",
        measure_dev = "Here you can explain how to measure the construct"
        );
    generate_construct_overview(exampleDCT);
```

    generate_dct_template \(D C T\) templates
    
## Description

These functions can generate one or more empty DCT templates.

## Usage

```
    generate_dct_template(
        prefix = paste(sample(letters, 4), collapse = ""),
        output = NULL,
        overwrite = FALSE,
        createDirs = FALSE,
        addComments = TRUE,
        stopOnIllegalChars = FALSE
    )
    generate_dct_templates(
        x,
        outputDir = NULL,
        createDirs = FALSE,
        addComments = FALSE,
        stopOnIllegalChars = FALSE
    )
```


## Arguments

prefix, $x \quad$ The prefix (prefix) or vector of prefixes ( $x$ ) to use.
output, outputDir
The filename or directory to which to write the templates.
overwrite Whether to overwrite any existing files.
createDirs Whether to recursively create the directories if the path specified in output or outputPath does not yet exist.
addComments Whether to add comments to the DCT specification as extra explanation.
stopOnIllegalChars
DCT identifier prefixes can only contain upper- and lowercase letters and underscores. This argument specifies whether to remove illegal characters with a warning, or whether to throw an error (and stop) if illegal characters are found,

## Value

The DCT template(s), either invisibly (if output or outputDir is specified) or visibly.

## generate_id Generate unique identifier(s)

## Description

To allow unique reference to constructs, they require unique identifiers. These functions generate such identifiers by combining one or more identifier prefixes (usually a human-readable construct name such as 'attitude') with a unique identifier based on the second the identifier was generated. The identifier prefix may only contain lowercase and uppercase letters and underscores.

## Usage

```
generate_id(
    prefix = paste(sample(letters, 4), collapse = ""),
    stopOnIllegalChars = FALSE
    )
    generate_ids(x, stopOnIllegalChars = FALSE)
```


## Arguments

prefix An identifier prefix.
stopOnIllegalChars
Whether to base::stop() or produce a base: :warning() when encountering illegal characters (i.e. anything other than a letter or underscore).
x
A vector of identifier prefixes.

## Value

a character vector containing the identifier(s).

## Examples

generate_id('attitude');

```
invert_id Invert identifier
```


## Description

Invert the identifier (generated by generate_id() for one or more constructs. This means that the identifier prefix is stripped and the last part is converted back from base 30 to base 10 .

## Usage

invert_id(x)

## Arguments

x
The identifier(s) as a character vector.

## Value

The identifier(s) as a numeric vector.

## Examples

invert_id(generate_id('example'));
load_dct_dir Load DCT specifications from a file or multiple files

## Description

These function load DCT specifications from the YAML fragments in one (load_dct_specs) or multiple files (load_dct_dir).

## Usage

load_dct_dir( path, recursive = TRUE, extension = "<br>.rock|<br>.dct<br>.yaml|<br>.yaml|<br>.yml", regex, dctContainer = "dct", headingLevel $=2$, delimiterRegEx = "^---\$", ignoreOddDelimiters = FALSE, encoding = "UTF-8", sortDecreasing = FALSE, silent = TRUE
)
load_dct_specs( text, file, delimiterRegEx = "^---\$", dctContainer = "dct", headingLevel = 2, ignoreOddDelimiters = FALSE, encoding = "UTF-8", silent = TRUE
)
\#\# S3 method for class 'dct_specs'

```
print(x, ...)
## S3 method for class 'dct_specs'
plot(x, ...)
```


## Arguments

| path | The path containing the files to read. |
| :--- | :--- |
| recursive | Whether to also process subdirectories (TRUE) or not (FALSE). |
| extension | The extension of the files to read; files with other extensions will be ignored. |
| Multiple extensions can be separated by a pipe (I). |  |
| regex | Instead of specifing an extension, it's also possible to specify a regular expres- <br> sion; only files matching this regular expression are read. If specified, regex <br> takes precedece over extension, |
| dctContainer | The container of the DCT specifications in the YAML fragments. Because only <br> DCT specifications are read that are stored in this container, the files can contain <br> YAML fragments with other data, too, without interfering with the parsing of |
| the DCT specifications. |  |

## Details

load_dct_dir simply identifies all files and then calls load_dct_specs for each of them. load_dct_specs loads the YAML fragments containing the DCT specifications using yum: : load_yaml_fragments() and then parses the DCT specifications into a visual representation as a DiagrammeR::DiagrammeR graph and Markdown documents with the instructions for creating measurement instruments or manipulations, and for coding measurement instruments, manipulations, or aspects of a construct.

## Value

An object with the DiagrammeR::DiagrammeR graph stored in output\$basic_graph, a DiagrammeR::DiagrammeR graph with a summary of which specifications are provided for each construct in output\$completeness_graph and the instructions in output\$instr.

## Examples

```
    exampleSpec <-
        system.file("extdata",
            "example.dct.yaml",
            package="psyverse");
    dctObject <- load_dct_specs(exampleSpec);
    ## Not run:
    psyverse::load_dct_dir(path="A:/some/path");
    ## End(Not run)
```

    opts Options for the psyverse package
    
## Description

The psyverse::opts object contains three functions to set, get, and reset options used by the escalc package. Use psyverse: :opts\$set to set options, psyverse: :opts\$get to get options, or psyverse: : opts\$reset to reset specific or all options to their default values.

## Usage

opts

## Format

An object of class list of length 4.

## Details

It is normally not necessary to get or set psyverse options.
The following arguments can be passed:
... For psyverse::opts\$set, the dots can be used to specify the options to set, in the format option = value, for example, encoding = "UTF-8". For psyverse: :opts\$reset, a list of options to be reset can be passed.
option For psyverse: : opts\$set, the name of the option to set.
default For psyverse: :opts $\$$ get, the default value to return if the option has not been manually specified.

The following options can be set:
encoding The default encoding used to read or write files.

## Examples

```
### Get the default encoding
psyverse::opts$get(encoding);
### Set it to UTF-8-BOM
psyverse::opts$set(encoding = "UTF-8-BOM");
### Check that it worked
psyverse::opts$get(encoding);
### Reset this option to its default value
psyverse::opts$reset(encoding);
### Check that the reset worked, too
psyverse::opts$get(encoding);
```

parse_dct_specs Parse DCT specifications

## Description

This function parses DCT specifications; it's normally called by load_dct_dir() or load_dct_specs(), so you won't have to use it directly.

## Usage

parse_dct_specs( dctSpecs, headingLevel = 2, hyperlink_UCIDs = TRUE,

```
    urlPrefix = "#",
    HTMLoutput = FALSE,
    sortDecreasing = FALSE
)
```


## Arguments

dctSpecs The DCT specifications (a list).
headingLevel The heading level for Markdown output.
hyperlink_UCIDs, urlPrefix, HTMLoutput
Passed on to the generate_instruction_overview() and generate_construct_overview() functions.
sortDecreasing Whether to sort the constructs in decreasing order (TRUE), in increasing order (FALSE), or not at all (NULL).

## Value

The object of parsed DCT specifications.

```
read_spreadsheet Convenience function to read spreadsheet-like files
```


## Description

Currently reads spreadsheets from Google Sheets or from xlsx, csv, or sav files. Normally, you don't use this, but instead you use dct_from_spreadsheet().

## Usage

read_spreadsheet( x ,
sheet $=$ NULL, columnDictionary = NULL, localBackup = NULL, exportGoogleSheet = TRUE, flattenSingleDf = FALSE, xlsxPkg = c("rw_xl", "openxlsx", "XLConnect"), failQuietly = FALSE, silent = psyverse::opts\$get("silent")
)

## Arguments

X
sheet

The URL or path to a file.
Optionally, the name(s) of the worksheet(s) to select.

```
columnDictionary
Optionally, a dictionary with column names to check for presence. A named list
of vectors.
localBackup If not NULL, a valid filename to write a local backup to.
exportGoogleSheet
    If x is a URL to a Google Sheet, instead of using the googlesheets4 package to
    download the data, by passing exportGoogleSheet=TRUE, an export link will
    be produced and the data will be downloaded as Excel spreadsheet.
flattenSingleDf
    Whether to return the result as a data frame if only one data frame is returned as
    a result.
xlsxPkg Which package to use to work with Excel spreadsheets.
failQuietly Whether to give an error when x is not a valid URL or existing file, or just return
    NULL invisibly.
silent Whether to be silent or chatty.
```


## Value

A list of dataframes, or, if only one data frame was loaded and flattenSingleDf is TRUE, a data frame.

## Examples

```
### Note that this example requires an internet connection!
read_spreadsheet(
    paste0(
        "https://docs.google.com/",
        "spreadsheets/d/",
        "1bHDzpCu4CwEa5_3_q_9vH2691XPhCS3e4Aj_HLhw_U8"
    )
);
```

    repeatStr Repeat a string a number of times
    
## Description

Repeat a string a number of times

## Usage

```
repeatStr(n = 1, str = " ")
```


## Arguments

$\begin{array}{ll}n \text {, str } & \begin{array}{l}\text { Normally, respectively the frequency with which to repeat the string and the } \\ \text { string to repeat; but the order of the inputs can be switched as well. }\end{array}\end{array}$

## Value

A character vector of length 1.

## Examples

```
### 10 spaces:
repStr(10);
### Three euro symbols:
repStr("\u20ac", 3);
```

save_to_yaml Save a psyverse object or YAML character vector to a file

## Description

Pretty much what it says on the box. But check the bit about encoding.

## Usage

```
    save_to_yaml(
        x ,
        file,
        preventOverwriting = psyverse::opts\$get("preventOverwriting"),
        encoding = psyverse::opts\$get("encoding")
    )
```


## Arguments

x
The object to save.
file The file to save to.
preventOverwriting
Whether to prevent overwriting.
encoding The encoding to use. Note that in general, encoding seems to have been invented primarily as a source of frustration, and it rarely disappoints. If unsure, use UTF-8. If using UTF-8, the approach from https://kevinushey.github.io/ blog/2018/02/21/string-encoding-and-r/ will be used.

## Value

The character vector that was written to the file.
vecTxt Easily parse a vector into a character value

## Description

Easily parse a vector into a character value

## Usage

```
vecTxt(
    vector,
    delimiter = ", ",
    useQuote = "",
    firstDelimiter = NULL,
    lastDelimiter = " & ",
    firstElements = 0,
    lastElements = 1,
    lastHasPrecedence = TRUE
)
vecTxtQ(vector, useQuote = "'", ...)
```


## Arguments

vector The vector to process.
delimiter, firstDelimiter, lastDelimiter
The delimiters to use for respectively the middle, first firstElements, and last lastElements elements.
useQuote This character string is pre- and appended to all elements; so use this to quote all elements (useQuote="'"), doublequote all elements (useQuote='"'), or anything else (e.g. useQuote='|'). The only difference between vecTxt and vecTxtQ is that the latter by default quotes the elements.
firstElements, lastElements
The number of elements for which to use the first respective last delimiters
lastHasPrecedence
If the vector is very short, it's possible that the sum of firstElements and lastElements is larger than the vector length. In that case, downwardly adjust the number of elements to separate with the first delimiter (TRUE) or the number of elements to separate with the last delimiter (FALSE)?
... Any addition arguments to vecTxtQ are passed on to vecTxt.

## Value

A character vector of length 1.

## Examples

vecTxtQ(names(mtcars));

$$
\text { viewHTML } \quad \text { Display HTML }
$$

## Description

This function displays HTML in the viewer, adding <body> and <head> tags (which should therefore not be included in the fragment).

## Usage

viewHTML(x, title = "Psyverse", css = "body \{font-size: 16px;\}")

## Arguments

| $x$ | The HTML fragment |
| :--- | :--- |
| title | The title |
| css | CSS |

## Value

Invisibly, $x$, with the extra HTML bits added.

## Examples

```
### Only run this example in an interactive R session,
### as it shows the HTML in the viewer.
if (interactive()) {
    psyverse::viewHTML("<strong>Hello world!</strong>");
}
```


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