

# Package ‘permChacko’

July 23, 2025

**Title** Chacko Test for Order-Restriction with Permutation

**Version** 1.0.1

**Date** 2024-09-18

**Description** Implements an extension of the Chacko chi-square test for ordered vectors (Chacko, 1966, <<https://www.jstor.org/stable/25051572>>). Our extension brings the Chacko test to the computer age by implementing a permutation test to offer a numeric estimate of the p-value, which is particularly useful when the analytic solution is not available.

**License** GPL (>= 3)

**Encoding** UTF-8

**RoxygenNote** 7.3.2

**Imports** methods

**Suggests** knitr, rmarkdown, testthat (>= 3.0.0)

**Config/testthat/edition** 3

**URL** <https://ocbe-uio.github.io/permChacko/>

**BugReports** <https://github.com/ocbe-uio/permChacko/issues>

**VignetteBuilder** knitr

**NeedsCompilation** no

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<code>.onAttach</code>	<i>Prints welcome message on package attachment</i>
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### Description

Prints package version number and welcome message on package load

### Usage

```
.onAttach(libname, pkgname)
```

### Arguments

<code>libname</code>	library location. See <code>?base::.onAttach</code> for details
<code>pkgname</code>	package name. See <code>?base::.onAttach</code> for details

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<code>chacko63_tab1</code>	<i>Table I</i>
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### Description

Table of  $p_{m,k}$ . Gives the values of  $p_{m,k}$  for equal sample sizes and  $k = 3, 4, \dots, 10$ .

### Usage

```
chacko63_tab1
```

### Format

An object of class `matrix` (inherits from `array`) with 10 rows and 8 columns.

### References

Chacko, V. J. (1963). Testing homogeneity against ordered alternatives. *The Annals of Mathematical Statistics*, 945-956.

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`chacko66_sec3`*Chacko (1966), section 3*

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**Description**

A multinomial example with 5 cell frequencies

**Usage**`chacko66_sec3`**Format**

An object of class integer of length 5.

**References**

Chacko, V. J. (1966). Modified chi-square test for ordered alternatives. *Sankhyā: The Indian Journal of Statistics, Series B*, 185-190.

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`chacko66_sec5`*Chacko (1966), section 5*

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**Description**

A plate with the humidity values continuously decreasing was divided into 10 equal parts and 20 termites introduced on each part. The number of termites counted as a specified time interval on each of the 10 parts of the plate are shown in the dataset

**Usage**`chacko66_sec5`**Format**

An object of class integer of length 10.

**References**

Chacko, V. J. (1966). Modified chi-square test for ordered alternatives. *Sankhyā: The Indian Journal of Statistics, Series B*, 185-190.

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permChacko

*The Chacko test for order-restriction with permutation test*

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## Description

The Chacko test for order-restriction with permutation test

## Usage

```
permChacko(x, n_perm = 1000L, verbosity = 0)
```

## Arguments

x	vector of numeric values
n_perm	number of permutations to calculate the p-value numerically
verbosity	if TRUE, prints intermediate messages and output

## Value

A list containing the test statistic, p-values (analytic, numeric and tabular, when available), the number of permutations performed, the original data and the reduced data. Use [names\(\)](#) and [str\(\)](#) on the output for more details.

## References

Chacko, V. J. (1963). Testing homogeneity against ordered alternatives. *The Annals of Mathematical Statistics*, 945-956.

Chacko, V. J. (1966). Modified chi-square test for ordered alternatives. *Sankhyā: The Indian Journal of Statistics, Series B*, 185-190.

## Examples

```
ruxton221207 <- c(6, 8, 4, 7, 3)
chacko66_sec3 <- c(10L, 16L, 14L, 12L, 18L)
chacko66_sec5 <- c(12L, 14L, 18L, 16L, 22L, 20L, 18L, 24L, 26L, 30L)

permChacko(ruxton221207)
permChacko(chacko66_sec3)
permChacko(chacko66_sec5)
```

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reduceVector	<i>Reduce a vector using the ordering process</i>
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**Description**

This function implements the ordering process described in Chacko (1963) and Chacko (1966).

**Usage**

```
reduceVector(x, verbosity = 0L)
```

**Arguments**

x	a vector of numeric values
verbosity	a natural number indicating the amount of output to print

**Value**

A list containing the original vector, the reduced vector, their weights and the number of reductions performed. Use [names\(\)](#) and [str\(\)](#) on the output for more details.

**Author(s)**

Waldir Leoncio

**Examples**

```
reduceVector(c(10, 16, 14, 12, 18))
reduceVector(c(10, 8, 4, 2, 1))
reduceVector(chacko66_sec3)
reduceVector(chacko66_sec5)
reduceVector(chacko66_sec5, verbosity = 1)
```

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ruxton221207	<i>Example by Graeme Ruxton</i>
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**Description**

A simple example showing how a vector can be reduced to one element.

**Usage**

```
ruxton221207
```

**Format**

An object of class `numeric` of length 5.

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