

# Package ‘maraca’

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**Version** 0.5.0

**Type** Package

**Title** The Maraca Plot: Visualization of Hierarchical Composite Endpoints in Clinical Trials

**License** Apache License (>= 2)

**Description** Library that supports visual interpretation of hierarchical composite endpoints (HCEs). HCEs are complex constructs used as primary endpoints in clinical trials, combining outcomes of different types into ordinal endpoints, in which each patient contributes the most clinically important event (one and only one) to the analysis.

**URL** <https://github.com/AstraZeneca/maraca>

**BugReports** <https://github.com/AstraZeneca/maraca/issues>

**Encoding** UTF-8

**LazyData** true

**Depends** R (>= 3.5)

**Imports** dplyr (>= 1.0), tidyr (>= 1.2), ggplot2 (>= 3.3), hce (>= 0.0.2), checkmate (>= 2.1)

**RoxygenNote** 7.2.1

**Suggests** knitr (>= 1.39), here (>= 1.0.1), lintr (>= 3.0.0), withr (>= 2.5.0), testthat (>= 3.1), rmarkdown

**NeedsCompilation** no

**VignetteBuilder** knitr

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**Repository** CRAN

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hce_scenario_a	<i>Example HCE scenario A.</i>
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### Description

This is example data frame containing the example for scenario A.

### Usage

```
data(hce_scenario_a)
```

### Format

A data frame with 1000 rows.

**X** Row number

**SUBJID** The patient identifier

**GROUP** Which type of outcome the row belongs to

**GROUPN** Not required for computation. The group as an arbitrary numerical value

**AVAL0** Contains both the time-to-event data for hard outcomes and the continuous data for the continuous outcome

**AVAL** Not required for computation. Create an ordered sequence of values where the AVAL0 value associated with the patient is offset by GROUPN

**TRTP** Treatment group

---

hce_scenario_b	<i>Example HCE scenario B.</i>
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**Description**

This is example data frame containing the example for scenario B.

**Usage**

```
data(hce_scenario_b)
```

**Format**

A data frame with 1000 rows.

**X** Row number

**SUBJID** The patient identifier

**GROUP** Which type of outcome the row belongs to

**GROUPN** Not required for computation. The group as an arbitrary numerical value

**AVAL0** Contains both the time-to-event data for hard outcomes and the continuous data for the continuous outcome

**AVAL** Not required for computation. Create an ordered sequence of values where the AVAL0 value associated with the patient is offset by GROUPN

**TRTP** Treatment group

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hce_scenario_c	<i>Example HCE scenario C.</i>
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**Description**

This is example data frame containing the example for scenario C.

**Usage**

```
data(hce_scenario_c)
```

**Format**

A data frame with 1000 rows.

**X** Row number

**SUBJID** The patient identifier

**GROUP** Which type of outcome the row belongs to

**GROUPN** Not required for computation. The group as an arbitrary numerical value

**AVAL0** Contains both the time-to-event data for hard outcomes and the continuous data for the continuous outcome

**AVAL** Not required for computation. Create an ordered sequence of values where the AVAL0 value associated with the patient is offset by GROUPN

**TRTP** Treatment group

---

hce\_scenario\_d

*Example HCE scenario D.*

---

**Description**

This is example data frame containing the example for scenario D.

**Usage**

```
data(hce_scenario_d)
```

**Format**

A data frame with 1000 rows.

**X** Row number

**SUBJID** The patient identifier

**GROUP** Which type of outcome the row belongs to

**GROUPN** Not required for computation. The group as an arbitrary numerical value

**AVAL0** Contains both the time-to-event data for hard outcomes and the continuous data for the continuous outcome

**AVAL** Not required for computation. Create an ordered sequence of values where the AVAL0 value associated with the patient is offset by GROUPN

**TRTP** Treatment group

---

hce\_scenario\_kccq3      *Example HCE scenario KCCQ3.*

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### Description

This is example data frame containing the example for scenario KCCQ3.

### Usage

```
data(hce_scenario_kccq3)
```

### Format

A data frame with 5000 rows.

**SUBJID** The patient identifier

**GROUP** Which type of outcome the row belongs to

**GROUPN** Not required for computation. The group as an arbitrary numerical value

**AVAL0** Contains both the time-to-event data for hard outcomes and the continuous data for the continuous outcome

**AVAL** Not required for computation. Create an ordered sequence of values where the AVAL0 value associated with the patient is offset by GROUPN

**TRTP** Treatment group

**HFHT** Not needed

**SEED** Not needed

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maraca                      *maraca package.*

---

### Description

Creates the maraca analysis object as an S3 object of class 'maraca'.

### Usage

```
maraca(
  data,
  tte_outcomes,
  continuous_outcome,
  arm_levels = c(active = "active", control = "control"),
  column_names = c(outcome = "outcome", arm = "arm", value = "value"),
  fixed_followup_days,
  compute_win_odds = FALSE
)

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

**Arguments**

<code>data</code>	A data frame with columns for the following information: - outcome column, containing the time-to-event and continuous labels - arm column, containing the arm a given row belongs to. - value column, containing the values.
<code>tte_outcomes</code>	A vector of strings containing the time-to-event outcome labels. The order is kept for the plot.
<code>continuous_outcome</code>	A single string containing the continuous outcome label.
<code>arm_levels</code>	A named vector of exactly two strings, mapping the values used for the active and control arms to the values used in the data. The names must be "active" and "control" in this order. Note that this parameter only need to be specified if you have labels different from "active" and "control".
<code>column_names</code>	A named vector to map the outcome, arm, value to the associated column names in the data. The vector names must match in order "outcome", "arm", and "value". Note that this parameter only need to be specified if you have column names different from the ones above.
<code>fixed_followup_days</code>	A mandatory specification of the integer number of fixed follow-up days in the study.
<code>compute_win_odds</code>	If TRUE compute the win odds, otherwise (default) don't compute them.
<code>x</code>	an object of class <code>maraca</code>
<code>...</code>	further arguments passed to or from other methods.

**Value**

An object of class 'maraca'. The object information must be considered private.

**Examples**

```
data(hce_scenario_a)
hce_test <- maraca(
  data = hce_scenario_a,
  tte_outcomes = c("Outcome I", "Outcome II", "Outcome III", "Outcome IV"),
  continuous_outcome = "Continuous outcome",
  fixed_followup_days = 3 * 365,
  column_names = c(outcome = "GROUP", arm = "TRTP", value = "AVAL0"),
  arm_levels = c(active = "Active", control = "Control"),
  compute_win_odds = TRUE
)
```

---

plot.hce

*Generic function to plot the hce object using plot().*


---

## Description

Generic function to plot the hce object using plot().

## Usage

```
## S3 method for class 'hce'
plot(
  x,
  continuous_outcome = "C",
  continuous_grid_spacing_x = 10,
  trans = "identity",
  density_plot_type = "default",
  vline_type = "median",
  fixed_followup_days = NULL,
  compute_win_odds = FALSE,
  ...
)
```

## Arguments

x	an object of S3 class 'hce'.
continuous_outcome	A single string containing the continuous outcome label. Default value "C".
continuous_grid_spacing_x	The spacing of the x grid to use for the continuous section of the plot.
trans	the transformation to apply to the data before plotting. The accepted values are the same that <code>ggplot2::scale_x_continuous</code>
density_plot_type	The type of plot to use to represent the density. Accepts "default", "violin", "box" and "scatter".
vline_type	what the vertical dashed line should represent. Accepts "median", "mean", "none".
fixed_followup_days	Not needed if HCE object contains information on fixed follow-up days in the study (column TTEfixed). Otherwise, this argument must be specified. Note: If argument is specified and HCE object contains TTEfixed column, then fixed_followup_days argument is used.
compute_win_odds	If TRUE compute the win odds, otherwise (default) don't compute them.
...	not used

**Value**

Used for side effect. Plots the maraca object.

**Examples**

```
set.seed(31337)
Rates_A <- c(1.72, 1.74, 0.58, 1.5, 1)
Rates_P <- c(2.47, 2.24, 2.9, 4, 6)
HCE <- hce::simHCE(n = 2500, TTE_A = Rates_A, TTE_P = Rates_P,
                  CM_A = -3, CM_P = -6, CSD_A = 16, CSD_P = 15, fixedfy = 3)
plot(HCE)
plot(HCE, fixed_followup_days = 3 * 365)
```

---

plot.maraca

*Generic function to plot the maraca object using plot().*

---

**Description**

Generic function to plot the maraca object using plot().

**Usage**

```
## S3 method for class 'maraca'
plot(
  x,
  continuous_grid_spacing_x = 10,
  trans = "identity",
  density_plot_type = "default",
  vline_type = "median",
  ...
)
```

**Arguments**

x	An object of S3 class 'maraca'.
continuous_grid_spacing_x	The spacing of the x grid to use for the continuous section of the plot.
trans	the transformation to apply to the data before plotting. The accepted values are the same that <code>ggplot2::scale_x_continuous</code>
density_plot_type	The type of plot to use to represent the density. Accepts "default", "violin", "box" and "scatter".
vline_type	what the vertical dashed line should represent. Accepts "median", "mean", "none".
...	not used



**Value**

Used for side effect. Plots the maraca object.

**Examples**

```
data(hce_scenario_a)
hce_test <- maraca(
  data = hce_scenario_a,
  tte_outcomes = c("Outcome I", "Outcome II", "Outcome III", "Outcome IV"),
  continuous_outcome = "Continuous outcome",
  fixed_followup_days = 3 * 365,
  column_names = c(outcome = "GROUP", arm = "TRTP", value = "AVAL0"),
  arm_levels = c(active = "Active", control = "Control"),
  compute_win_odds = TRUE
)
plot(hce_test)
```

---

plot_maraca	<i>Creates and returns the plot of the maraca data.</i>
-------------	---

---

**Description**

Creates and returns the plot of the maraca data.

**Usage**

```
plot_maraca(
  obj,
  continuous_grid_spacing_x = 10,
  trans = "identity",
  density_plot_type = "default",
  vline_type = "median"
)
```

**Arguments**

obj	an object of S3 class 'maraca'
continuous_grid_spacing_x	The spacing of the x grid to use for the continuous section of the plot.
trans	the transformation to apply to the data before plotting. The accepted values are the same that <code>ggplot2::scale_x_continuous</code>
density_plot_type	which type of plot to display in the continuous part of the plot. Options are "default", "violin", "box", "scatter".
vline_type	what the vertical lines in the continuous part of the plot should highlight. Options are "median", "mean", "none".

**Value**

a ggplot2 object of the data. This function will not render the plot immediately. You have to print() the returned object for it to be displayed.

**Examples**

```
data(hce_scenario_a)
hce_test <- maraca(
  data = hce_scenario_a,
  tte_outcomes = c("Outcome I", "Outcome II", "Outcome III", "Outcome IV"),
  continuous_outcome = "Continuous outcome",
  fixed_followup_days = 3 * 365,
  column_names = c(outcome = "GROUP", arm = "TRTP", value = "AVAL0"),
  arm_levels = c(active = "Active", control = "Control"),
  compute_win_odds = TRUE
)
plot <- plot_maraca(hce_test)
```

---

validate\_maraca\_plot    *Generic function to generate validation data for the maraca plot object.*

---

**Description**

This will produce the 4 validation datasets.

**Usage**

```
validate_maraca_plot(x, ...)
```

**Arguments**

x                    An object of S3 class 'maracaPlot'.  
...                  Not used.

**Value**

Creates a list of datasets for validation purposes.

**Examples**

```
data(hce_scenario_a)
hce_test <- maraca(
  data = hce_scenario_a,
  tte_outcomes = c("Outcome I", "Outcome II", "Outcome III", "Outcome IV"),
  continuous_outcome = "Continuous outcome",
  fixed_followup_days = 3 * 365,
  column_names = c(outcome = "GROUP", arm = "TRTP", value = "AVAL0"),
```

```
    arm_levels = c(active = "Active", control = "Control"),  
    compute_win_odds = TRUE  
  )  
p <- plot(hce_test)  
validate_maraca_plot(p)
```

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