

# Rdocumentation

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Stat\_test\_Delta\_AUC\_Group\_Specific

*T-statistic of the Difference of AUC of Two Group-Specific Polynomial  
Marginal Dynamics*

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## Description

This function performs the t-test evaluating whether the difference of area under the curve of two marginal dynamics, modeled by group-structured polynomials or B-spline curve in Mixed-Effects model, is null.

## Usage

```
Stat_test_Delta_AUC_Group_Specific(  
  MEM_Pol_group, Group1, Group2,  
  time.G1, time.G2, common.interval = TRUE,  
  method = "trapezoid", Group.dependence = TRUE,  
  Averaged = FALSE, conf_level = 0.95,  
  alternative = "two.sided"  
)
```

## Arguments

MEM\_Pol\_group A list with similar structure than the output provided by the function [MEM\\_Polynomial\\_Group\\_struct](#)

A list containing:

- Model\_estimation: a list containing at least 2 elements:
  1. the vector of the marginal (fixed) parameters estimates (at least for the groups whose AUC is to estimate), labeled '*beta*'.
  2. the variance-covariance matrix of these parameters, labeled '*varFix*' (see [MEM\\_Polynomial\\_Group\\_structure](#) for details about the parameter order).
- Model\_features: a list of at least 2 elements:
  1. Groups: a vector indicating the names of the groups whose fixed parameters are given.
  2. Marginal.dyn.feature: a list summarizing the features of the marginal dynamics defined in the model:

- `dynamic.type`: a character scalar indicating the chosen type of marginal dynamics. Options are 'polynomial' or 'spline'.
- `intercept`: a logical vector summarizing choices about global and group-specific intercepts (Number of groups + 1) elements whose elements are named as ('global.intercept', 'group.intercept1', ..., 'group.interceptG') if G Groups are defined in `MEM_Po1_group`. For each element of the vector, if TRUE, the considered intercept is considered as included in the model (see *Examples*).

If `dynamic.type` is defined as 'polynomial':

- `polynomial.degree`: an integer vector indicating the degree of polynomial functions, one value for each group.

If `dynamic.type` is defined as 'spline':

- `spline.degree`: an integer vector indicating the degree of B-spline curves, one for each group.
- `knots`: a list of group-specific internal knots used to build B-spline basis (one numerical vector for each group) (see [bs](#) for more details).
- `df`: a numerical vector of group-specific degrees of freedom used to build B-spline basis, (one for each group).
- `boundary.knots`: a list of group-specific boundary knots used to build B-spline basis (one vector for each group) (see [bs](#) for more details).

Group1	a character scalar indicating the name of the first group whose marginal dynamics must be considered. This group name must belong to the set of groups involved in the MEM (see Groups vector in <code>MEM_Po1_group</code> ).
Group2	a character scalar indicating the name of the second group whose marginal dynamics must be considered. This group name must belong to the set of groups involved in the MEM (see Groups vector in <code>MEM_Po1_group</code> ).
time.G1	a numerical vector of time points (x-axis coordinates) to use for the Group1 AUC calculation.
time.G2	a numerical vector of time points (x-axis coordinates) to use for the Group2 AUC calculation.
common.interval	a logical scalar. If FALSE, the difference of AUC is calculated as the difference of AUCs where the AUC of each group is calculated on its specific interval of time. If TRUE (default), the difference of AUC is estimated on a common interval of time defined as the intersect of the two group-specific interval (see <a href="#">Group_specific_Delta_AUC_estimation</a> for more details about calculation).
method	a character scalar indicating the interpolation method to use to estimate the AUC. Options are 'trapezoid' (default), 'lagrange' and 'spline'. In this version, the 'spline' interpolation is implemented with "not-a-knot" spline boundary conditions.
Group.dependence	a logical scalar indicating whether the two groups, whose the difference of AUC ( $\Delta$ AUC) is studied, are considered as dependent. By default, this variable is defined as TRUE.
Averaged	a logical scalar. If TRUE, the function return the difference of normalized AUC (nAUC) where nAUC is computed as the AUC divided by the range of time of calculation. If FALSE (default), the classic AUC is calculated.
conf_level	a numerical value (between 0 and 1) indicating the confidence level of the interval. By default, this variable is fixed at 0.95

**alternative** a character scalar specifying the alternative hypothesis. Options are 'two.sided' (default), 'greater' or 'less'.

### Value

A list containing:

- **Tstat**: the value of the t-statistic.
- **Pvalue**: the P-value.
- **Conf.int**: the confidence interval.
- **Delta\_AUC**: the estimated value of the difference of AUC between the two groups (nAUC2 - nAUC1) (see [Group\\_specific\\_Delta\\_AUC\\_estimation](#) for more details).
- **AUCs**: the estimated values of the Group-specific AUC (AUC1 and AUC 2) (see [Group\\_specific\\_AUC\\_estimation](#) for more details).

### See Also

[MEM\\_Polynomial\\_Group\\_structure](#), [Group\\_specific\\_Delta\\_AUC\\_estimation](#),  
[Group\\_specific\\_AUC\\_estimation](#)

### Examples

```
# Download of data
data("HIV_Simu_Dataset_Delta01_cens")
data <- HIV_Simu_Dataset_Delta01_cens

# Change factors in character vectors
data$id <- as.character(data$id) ; data$Group <- as.character(data$Group)

MEM_estimation <- MEM_Polynomial_Group_structure(y=data$VL,x=data$time,Group=data$Group,
                                                Id=data$id,Cens=data$cens)

time_group1 <- unique(data$time[which(data$Group=="Group1")])
time_group2 <- unique(data$time[which(data$Group=="Group2")])
Test <- Stat_test_Delta_AUC_Group_Specific(MEM_Pol_group=MEM_estimation,
                                           Group1="Group1",Group2="Group2",
                                           time.G1=time_group1,time.G2=time_group2)
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