

# Package ‘MCM’

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**Type** Package

**Title** Estimating and Testing Intergenerational Social Mobility Effect

**Version** 0.1.7

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**Description** Estimate and test inter-generational social mobility effect on an outcome with cross-sectional or longitudinal data.

**Imports** survey, gee, dplyr, lme4, stringr, parameters

**License** GPL-2

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mcm

*Estimate and Test Inter-generational Social Mobility Effect on an Outcome***Description**

This function implements the mobility contrast model designed for estimating and testing inter-generational mobility effect on an outcome.

**Usage**

```
mcm(
  formula,
  data,
  weights = 1,
  na.action = na.omit,
  origin,
  destination,
  family = gaussian(),
  contrasts = NULL,
  gee = FALSE,
  id = NULL,
  corstr = "exchangeable",
  displayresult = TRUE,
  ...
)
```

**Arguments**

formula	an object of class "formula" (or one that can be coerced to that class): a symbolic description of the model to be fitted. A typical model used in studying social mobility takes the form <code>response ~ origin*destination</code> , where <code>response</code> is the numeric response vector and <code>origin</code> ( <code>destination</code> ) is a vector indicating the origin ( <code>destination</code> ). The specification of <code>origin*destination</code> indicates the cross of <code>origin</code> and <code>destination</code> , which is the same as <code>origin + destination + origin:destination</code> where <code>origin:destination</code> indicates the interaction of <code>origin</code> and <code>destination</code> .
data	an optional data frame, list or environment (or object coercible by <code>as.data.frame</code> to a data frame) containing the variables in the model. If not found in <code>data</code> , the variables are taken from <code>environment(formula)</code> , typically the environment from which the function is called.
weights	an optional vector of unit-level sampling weights to be used in analysis. Should be <code>NULL</code> or a numeric vector.
na.action	a function which indicates what should happen when the data contain NAs. The default is set by the <code>na.action</code> setting in options and is <code>na.fail</code> if that is unset.

origin	a character indicating the column name of origin.
destination	a character indicating the column name of destination.
family	a character string, a function or the result of a call to a family function describing the error distribution and link function to be used in the model.
contrasts	an optional list. The default is set as sum-to-zero contrast.
gee	logical. Should gee be used in estimating the model?
id	a vector which identifies the clusters, which is required while gee is used. The length of id should be the same as the number of observations. Data are assumed to be sorted so that observations on a cluster are contiguous rows for all entities in the formula.
corstr	a character string specifying the correlation structure. The following are permitted: "independence", "fixed", "stat_M_dep", "non_stat_M_dep", "exchangeable", "AR-M" and "unstructured".
displayresult	logical. Should model results be displayed after estimation. The default is TRUE.
...	additional arguments to be passed to the function.

### Value

A list containing:

model	Fitted generalized models of outcome on predictors. See more on function <code>glm</code> in package <code>stats</code> .
origin_main	Estimated main effects of origin.
destination_main	Estimated main effects of destination.
mobility_estimates	Estimated mobility effects.
mobility_se	Standard errors of the estimated mobility effects.
mobility_sig	Statistical significance of the the estimated mobility effects.

### Examples

```
library(MCM)
data('sim_moderate_het')
mcm(response ~ origin * destination, data = sim_moderate_het,
      origin = "origin", destination="destination")
```

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mcm_lmer	<i>Estimate and Test Inter-generational Mobility Effect with Longitudinal Data</i>
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## Description

This function fits a multilevel mobility contrast model to estimate and test inter-generational mobility effect on an outcome in longitudinal data.

## Usage

```
mcm_lmer(
  formula,
  data = NULL,
  REML = TRUE,
  control = lme4::lmerControl(),
  start = NULL,
  verbose = 0L,
  subset,
  weights,
  na.action,
  offset,
  contrasts = NULL,
  devFunOnly = FALSE,
  origin = NULL,
  destination = NULL,
  time = NULL,
  displayresult = TRUE,
  ...
)
```

## Arguments

formula	Inherit the function form from lme4 package. It is a two-sided linear formula object describing both the fixed-effects and random-effects part of the model, with the response on the left of a ~ operator and the terms, separated by + operators, on the right. Random-effects terms are distinguished by vertical bars ( ) separating expressions for design matrices from grouping factors. Two vertical bars (  ) can be used to specify multiple uncorrelated random effects for the same grouping variable. (Because of the way it is implemented, the   -syntax works only for design matrices containing numeric (continuous) predictors; to fit models with independent categorical effects, see dummy or the lmer_alt function from the afex package.) A typical model used in studying social mobility with longitudinal data takes the form response ~ origin*destination +   id, where response is the numeric response vector and origin (destination) is a vector indicating the origin (destination). The specification of origin*destination indicates the cross of origin and destination, which is the same as origin +
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	destination + origin:destination where origin:destination indicates the interaction of origin and destination. id is a identifier for the clusters.
data	an optional data frame, list or environment (or object coercible by as.data.frame to a data frame) containing the variables in the model. If not found in data, the variables are taken from environment(formula), typically the environment from which the function is called.
REML	logical. Should the estimates be chosen be optimize the restricted log-likelihood (REML) criterial (as opposed to the log-likelihood)?
control	Inherit from lme4 package. It is a list (of correct class, resulting from lmerControl() or glmerControl() respectively) containing control parameters, including the nonlinear optimizer to be used and parameters to be passed through to the nonlinear optimizer, see the lmerControl documentation in lme4 package for details.
start	Inherit from lme4 package. It is a named list of starting values for the parameters in the model.
verbose	Inherit from lme4 package. It is an integer scalar. If > 0 verbose output is generated during the optimization of the parameter estimates. If > 1 verbose output is generated during the individual penalized iteratively reweighted least squares (PIRLS) steps.
subset	optional expression selecting the subset of the rows of data to fit the model.
weights	an optional vector of 'prior weights' to be used in the fitting process. Should be NULL or a numeric vector.
na.action	a function which indicates what should happen when the data contain NAs.The default is set by the na.action setting in options and is na.fail if that is unset.
offset	Inherit from lme4 package. This can be used to specify an a priori known component to be included in the linear predictor during fitting. This should be NULL or a numeric vector of length equal to the number of cases. One or more offset terms can be included in the formula instead or as well, and if more than one is specified their sum is used.
contrasts	an optional list. The default is set as sum-to-zero contrast.
devFunOnly	logical - return only the deviance evaluation function.
origin	a character indicating the column name of origin.
destination	a character indicating the column name of destination.
time	a character indicating the time when individual was observed
displayresult	logical. Should model results be displayed after estimation. The default is TRUE.
...	additional arguments to be passed to the function.

### Value

A list containing:

model	Fitted generalized models of outcome on predictors. See more on function glm in package stats.
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estimates	Estimated mobility effects.
se	Standard errors of the estimated mobility effects.
significance	Statistical significance of the the estimated mobility effects.
esti_3way	Estimated mobility effects conditional on specific age.
se_3way	Standard errors of the estimated mobility effects conditional specific age.
sig_3way	Statistical significance of the the estimated mobility effects conditional on age.

### Examples

```
library(MCM)
library(lme4)
data("sim_datlmer")
fit_mcm_lmer <- mcm_lmer(yij ~ origin*destination*age +
  (1|id), data = sim_datlmer,
  origin = "origin",
  destination = "destination",
  time = "age")
```

---

sim\_datlmer

*Simulated Data Studying Social Mobility (Longitudinal)*

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### Description

This is a simulated data used to study social mobility under longitudinal setting.

### Usage

```
data("sim_datlmer")
```

### Format

A data frame with 50000 observations on the following 14 variables.

id an ordered factor with levels  
 obs a numeric vector  
 eij a numeric vector  
 origin a factor with levels 1 2 3  
 destination a factor with levels 1 2 3  
 origin\_1 a numeric vector  
 origin\_2 a numeric vector  
 origin\_3 a numeric vector  
 destination\_1 a numeric vector

destination\_2 a numeric vector  
destination\_3 a numeric vector  
yij a numeric vector  
age a numeric vector  
dir a factor with levels 0 1 2

### Examples

```
data(sim_datlmer)
## maybe str(sim_datlmer) ; plot(sim_datlmer) ...
```

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sim_moderate_het	<i>Simulated Data Studying Social Mobility (Cross-Sectional)</i>
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### Description

This is a simulated data used to study social mobility. In this dataset, it is assumed that there exists a moderate social mobility.

### Usage

```
data("sim_moderate_het")
```

### Format

A data frame with 30,000 observations on the following 6 variables.

response a numeric vector indicating the outcome variable  
origin a numeric vector indicating parents' socioeconomic status  
destination a numeric vector indicating child' socioeconomic status  
mobility a numeric vector indicating if child's socioeconomic status is different from that of parents'.  
upmob a numeric vector indicating child' socioeconomic status is higher than that of parents'.  
downmob a numeric vector indicating child' socioeconomic status is lower than that of parents'.

### Examples

```
data(sim_moderate_het)
head(sim_moderate_het)
```

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