

# Package ‘Dominance’

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**Title** A Package to Calculate and Visualize Dominance Hierarchies

**Description** Functions to calculate ADI (Average Dominance Index) and FDI (Frequency-Based Dominance Index). Functions to visualize the Data with Social Network Graphs with Dual Directions and Music Notation Graph.

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**Depends** R (>= 3.1.0)

**Imports** igraph,chron,gdata,XLConnect

**Suggests**

**License** GPL-3

**URL** <https://github.com/etron770/R-Package-Dominance/issues>

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Dominance-package	<i>Dominance Calculation and Graphs in Animals</i>
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## Description

The package can calculate ADI (Average Dominance Index) and can build social network graphs with dual directions, can build a Music Notation Graph

## Details

The following are sources of information on **Dominance** package:

DESCRIPTION file `library(help="Dominance")`

This file package?Dominance

Some help files

[ADI](#)

[FDI](#)

[Sociogram](#)

[Musicnotation](#)

## Author(s)

Knut Krueger , Konstanze Krueger

Maintainer: Who to complain to <Knut.Krueger@equine-science.de>

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ADI	<i>Function ADI</i>
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---

## Description

A package to calculate Dominance Indices, print Soical Network Graphs and Music Notation Graphs.

## Usage

`ADI(data_sheet, bytes, ...)`

**Arguments**

data_sheet	<p><b>either</b> a data.frame f.e imported from a data sheet containing  "Name", "item.number"  "action.from.", "action.to", "kind.of.action"  "name.of.action", "action.number", "classification", "weighting"</p> <p><b>or</b> only "action.from.", "action.to", "kind.of.action" if exists actions and items</p> <p>actions: with "name.of.action", "action.number", "classification", "weighting"  Weighting the factor which should be used to calculate the behavior (1 for "action.from"" wins -1 for "action.to" wins")  Setting a behaviour to 2 means it is count double  items: with "Name", "item.number"</p>
bytes	<p>a string where each enabled action is set to 1 and each disabled action is set to 0  Setting a behaviour to 2 means it is count double</p>
...	<p>Additional parameters:</p> <p><b>actions</b> (data.frame) with "name.of.action", "action.number", "classification", "weighting";  Classification 1 if "action.from"" wins; Classification 2 if "action.to" wins  <b>Weighting</b> the factor which should be used to calculate the behavior (1 for "action.from"" wins -1 for "action.to" wins")  Setting a behaviour to 2 means it is count double  <b>vcolors</b> as much colors as items, colors will returned as sorted ADI colors  means color 1 = item rank 1, color 2 = item rank 2, and so on  <b>workbook</b> the XlConnect Workbook for the Excel file to be changed  note: The workbook must be opened before  <b>sheet</b> the sheet name ( ADI will be added to be sure not to delete any data  <b>savecounts</b> if TRUE: save the counts of actions as sheet (availalbe only with workbook  <b>saveAdi</b> if TRUE: save the FDI as sheet (availalbe only with workbook</p>

**Value**

returns a list with  
ADI - the Average Dominance index  
Colors - the colors supported by vcolors sorted by ADI of the items  
ADI\_count\_matrix - the counts from which the ADI was calculated

**Author(s)**

Knut Krueger, <Knut.Krueger@equine-science.de>

**References**

The Construction of Dominance Order: Comparing Performance of Five Methods Using an Individual-Based Model C. K. Hemelrijk, J. Wantia and L. Gyax, Behaviour Vol. 142, No. 8 (Aug., 2005),

pp. 1037-1058 <https://www.jstor.org/stable/4536286>  
 On using the DomWorld model to evaluate dominance ranking methods , de Vries, Han, Behaviour,  
 Volume 146, Number 6, 2009 , pp. 843-869(27) <https://dx.doi.org/10.1163/156853909X412241>

## Examples

```
{ #you can either use:
data_sheet=data.frame ("action.from"=c(1,4,2,3,4,3,4,3,4,3,4,3,4),
                        "action.to"=c(4,1,1,4,3,4,3,4,3,4,3,4,3),
"kind.of.action"= c(4,1,1,4,3,4,3,4,3,4,3,4,3),stringsAsFactors=FALSE)
items= data.frame ("Name"=c("item1","item2","item3","item4","item5","item6") ,
                  "item.number"=c(1:6),stringsAsFactors=FALSE)
actions=data.frame("name.of.action"= c("leading","following","approach","bite","threat to bite",
                                       "kick","threat to kick", "chase","retreat"),
                  "action.number"=c(1:9),
                  "classification"=c(1,2,1,1,1,1,1,1,2) ,
                  "weighting"=c(1,-1,1,1,1,1,1,1,-1),stringsAsFactors=FALSE)
#all encounters without leading and following
bytes= "001111111"
ADI(data_sheet,items=items,actions=actions,bytes)
# or you can use a complete f.e Excel sheet
# you can save this data as basic excel sheet to work with
data(data_ADI)
bytes= "001111111"
ADI(data_ADI,bytes)
}
```

---

change.action.without.response

*Function change.action.without.response*

---

## Description

A package to calculate Dominance Indices, print Soical Network Graphs and Music Notation Graphs.

## Usage

```
change.action.without.response(data.set, action, response, newaction, ...)
```

## Arguments

data.set	A data frame used f.e at ADI or FDI
action	the action which is to be searched for
response	the number of the action responding to param action
newaction	newaction must be: data.frame("name.of.action"="test","action.number"=1,"classification"=2,"weighting" or "change.only" if action is present and row kind.of.action should be changed'
...	Additional parameters:

**workbook** the XICConnect Workbook for the Excel file to be changed  
note: The workbook must be opened before  
**sheet** the sheet name ( data will be added to be sure not to delete any data

**Value**

the changed data.set

**Author(s)**

Knut Krueger, <Knut.Krueger@equine-science.de>

---

data\_ADI

*Demodata for ADI and FDI*

---

**Description**

Demodata to calculate an ADI and FDI

**Usage**

```
data(data_ADI)
```

**Format**

A data frame with 17 observations on the following 10 variables.

Name a character vector  
item.number a numeric vector  
action.from. a numeric vector  
action.to a numeric vector  
kind.of.action a numeric vector  
observation.number a numeric vector  
name.of.action a character vector  
action.number a numeric vector  
classification a numeric vector  
weighting a numeric vector

**Examples**

```
data(data_ADI)
```

---

data\_Musicnotation      *Demodata for Musicnotation*

---

**Description**

Demodata to show an Musicnotation Graph

**Usage**

```
data(data_Musicnotation)
```

**Format**

A data frame with 15 observations on the following 11 variables.

action.from a numeric vector

action.to a numeric vector

kind.of.action a numeric vector

Time a character vector

Name a character vector

item.number a numeric vector

dominance.order a numeric vector

name.of.action a character vector

action.number a numeric vector

classification a numeric vector

weighting a numeric vector

**Examples**

```
data(data_Musicnotation)
```

---

data\_Network\_1      *Demodata for Social network Graph*

---

**Description**

A dataset to show a bigger sociogramm

**Usage**

```
data(data_Network_1)
```

**Format**

A data frame with 800 observations on the following 16 variables.

Name a numeric vector

Beschreibung a character vector

item.number a numeric vector

dominance.order a character vector

age a character vector

sex a character vector

action.from. a numeric vector

action.to a numeric vector

kind.of.action a numeric vector

time a POSIXct

test.2.kind.of.action a numeric vector

test.3.kind.of.action a numeric vector

name.of.action a character vector

action.number a numeric vector

classification a numeric vector

weighting a numeric vector

**Examples**

```
data(data_Network_1)
```

---

data\_Network\_2

*Demodata for Social network Graph*

---

**Description**

A dataset to show a bigger sociogramm

**Usage**

```
data(data_Network_2)
```

**Format**

A data frame with 800 observations on the following 16 variables.

Name a numeric vector  
Beschreibung a character vector  
item.number a numeric vector  
dominance.order a character vector  
age a character vector  
sex a character vector  
action.from. a numeric vector  
action.to a numeric vector  
kind.of.action a numeric vector  
time a POSIXct  
test.2.kind.of.action a numeric vector  
test.3.kind.of.action a numeric vector  
name.of.action a character vector  
action.number a numeric vector  
classification a numeric vector  
weighting a numeric vector

**Examples**

```
data(data_Network_2)
```

---

detect\_bits                    *for internal use only*

---

**Description**

for internal use only

**Usage**

```
detect_bits(bits, set = TRUE)
```

**Arguments**

bits  
set                    if set = TRUE returns all true bits if set = false returns all false bits



**Author(s)**

Knut krueger

**Examples**

```
print('for internal use only')
```

FDI

*Function FDI***Description**

A package to calculate Dominance Indices, print Soical Network Graphs and Music Notation Graphs.

**Usage**

```
FDI(data_sheet, bytes, ...)
```

**Arguments**

data_sheet	<p><b>either</b> a data.frame f.e imported from a data sheet containing  "Name", "item.number"  "action.from.", "action.to", "kind.of.action"  "name.of.action", "action.number", "classification", "weighting"</p> <p><b>or</b> only "action.from.", "action.to", "kind.of.action" if exists actions and items</p> <p>actions: with "name.of.action", "action.number", "classification", "weighting"  items: with "Name", "item.number"</p>
bytes	<p>a string where each enabled action is set to 1 and each disabled action is set to 0  Setting a behaviour to 2 means it is count double</p>
...	<p><b>Additional parameters:</b></p> <p><b>actions</b> (data.frame) with "name.of.action", "action.number", "classification", "weighting";  Classification 1 if "action.from" wins; Classification 2 if "action.to" wins</p> <p><b>Weighting</b> the factor which should be used to calculate the behavior (1 for "action.from" wins -1 for "action.to" wins)  Setting a behaviour to 2 means it is count double</p> <p><b>vcolors</b> as much colors as items, colors will returned as sorted FDI colors  means color 1 = item rank 1, color 2 = item rank 2, and so on</p>

**workbook** the XlConnect Workbook for the Excel file to be changed  
 note: The workbook must be opened before  
**sheet** the sheet name ( FDI will be added to be sure not to delete any data  
**savecounts** if TRUE: save the counts of actions as sheet (availalbe only with  
 workbook  
**saveFDI** if TRUE: save the FDI as sheet (availalbe only with workbook

## Value

returns a list with  
 FDI - the Frequency Based Dominance index  
 Colors - the colors supported by vcolors sorted by FDI of the items  
 FDI\_count\_matrix - the counts from which the FDI was calculated

## Author(s)

Knut Krueger, <Knut.Krueger@equine-science.de>

## References

The Construction of Dominance Order: Comparing Performance of Five Methods Using an Individual-Based Model C. K. Hemelrijk, J. Wantia and L. Gygas, Behaviour Vol. 142, No. 8 (Aug., 2005), pp. 1037-1058 <https://www.jstor.org/stable/4536286>  
 On using the DomWorld model to evaluate dominance ranking methods , de Vries, Han, Behaviour, Volume 146, Number 6, 2009 , pp. 843-869(27) <https://dx.doi.org/10.1163/156853909X412241>

## Examples

```
{ #you can eihter use:
data_sheet=data.frame ("action.from"=c(1,4,2,3,4,3,4,3,4,3,4,3,4,3,4),
                        "action.to"=c(4,1,1,4,3,4,3,4,3,4,3,4,3,4,3),
"kind.of.action"= c(4,1,1,4,3,4,3,4,3,4,3,4,3,4,3),stringsAsFactors=FALSE)
items= data.frame ("Name"=c("item1","item2","item3","item4","item5","item6") ,
                  "item.number"=c(1:6),stringsAsFactors=FALSE)
actions=data.frame("name.of.action"= c("leading","following","approach","bite","threat to bite",
                                       "kick","threat to kick", "chase","retreat"),
                  "action.number"=c(1:9),
                  "classification"=c(1,2,1,1,1,1,1,1,2) ,
                  "weighting"=c(1,-1,1,1,1,1,1,1,-1),stringsAsFactors=FALSE)
#all encounters without leading and following
bytes= "001111111"
FDI(data_sheet,items=items,actions=actions,bytes)
# or you can use a complete f.e Excel sheet
# you can save this data as basic excel sheet to work with
data(data_ADI)
bytes= "001111111"
FDI(data_ADI,bytes)
}
```

---

musicnotation	<i>Function musicnotation</i>
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---

### Description

A function to visualize interaction with a musicnotation graph.

### Usage

```
Musicnotation(data_sheet, ...)
```

### Arguments

data_sheet	<p><b>either</b> a data.frame f.e imported from a data sheet containing          "Name", "item.number"          "action.from.", "action.to", "kind.of.action"          "name.of.action", "action.number", "classification", "weighting"</p> <p><b>or</b> only "action.from.", "action.to", "kind.of.action" if exists actions and items</p> <p>actions: with "name.of.action", "action.number", "classification", "weighting"          items: with "Name", "item.number"</p> <p>Setting a behaviour to 2 means it is count double</p>
...	<p><b>Additional parameters:</b></p> <p><b>colors</b> a factor of colors as much as actions</p> <p><b>lwd</b> line width if lwd_arrows is not used also for line width arrows # TODO          check this it not working -&gt; no show_items all items will be shown</p> <p><b>show_items</b> items to be shown</p> <p><b>angel_arrows</b> The angel aof the arrow head default 20</p> <p><b>length_arrows</b> the lenght of the arrow default 0.05</p> <p><b>lwd_arrows</b> the line width of the arrows default 1</p> <p><b>actions_colors</b> a vector of colors for actions f.e to show one special action</p> <p><b>starting_time</b> builds the graph with data bewteen starting and ending time</p> <p><b>ending_time</b> builds the graph with data bewteen starting and ending time</p> <p><b>user_colors</b> a vector of colors as much as items to show differetn colors for items</p> <p><b>color_bits</b> a vector of colors as much as items 1 shows the horse colored 0 in black (defined with actions_colors)</p>

### Value

returns a list with  
 ADI - the Average Dominance index

**Author(s)**

Knut Krueger, <Knut.Krueger@equine-science.de>

**References**

#Chase, I. D. (2006). Music notation: a new method for visualizing social interaction in animals and humans. *Front Zool*, 3, 18. <http://dx.doi.org/10.1186%2F1742-9994-3-18>

**Examples**

```
{ #you can either use:
data_sheet=data.frame ("action.from"=c(1,4,2,3,4,3,4,3,4,3,4,3,4),
                        "action.to"=c(4,1,1,4,3,4,3,4,3,4,3,4,3),
                        "kind.of.action"= c(4,1,1,4,3,4,3,4,3,4,3,4,3),
                        "Time"=c('03:15:00','03:17:30','03:20:00','03:20:30','03:21:00',
                                  '03:21:30','03:22:00','03:22:30','03:23:00','03:23:30',
                                  '03:25:00','03:25:30','03:26:00','03:26:30','03:27:00'),
                        stringsAsFactors=FALSE)
items= data.frame ("Name"=c("item1","item2","item3","item4","item5","item6") ,
                  "item.number"=c(1:6),stringsAsFactors=FALSE)
actions=data.frame("name.of.action"= c("leading","following","approach","bite","threat to bite",
                                       "kick","threat to kick", "chase","retreat"),
                  "action.number"=c(1:9),
                  "classification"=c(1,2,1,1,1,1,1,1,2) ,
                  "weighting"=c(1,-1,1,1,1,1,1,1,-1),stringsAsFactors=FALSE)
# set colors for special encounters
color= c("green","green","red","red","red","red","red","red")

Musicnotation(data_sheet=data_sheet,actions=actions,items=items,sort_dominance=TRUE)
#or you can use a complete f.e Excel sheet
#you can save this data as basic excel sheet to work with
data(data_Musicnotation)
Musicnotation(data_sheet=data_Musicnotation,sort_dominance=TRUE) }
```

---

search.win.lose

*for internal use only*

---

**Description**

counts the wins and loses

**Usage**

```
search.win.lose(data_sheet, ...)
```

**Arguments**

data\_sheet

...

**Author(s)**

Knut Krueger

**Examples**

```
print('for internal use only')
```

---

 Sociogram

*Social Network Graphs*


---

**Description**

computes social network graphs with igraph

**Usage**

```
Sociogram(data_sheet, bits, ...)
```

**Arguments**

<code>data_sheet</code>	either a data.frame f.e imported from a data sheet containing "Name","item.number" "action.from.,"action.to","kind.of.action" "name.of.action","action.number","classification","weighting" or only "action.from.,"action.to","kind.of.action"if exists actions and items data_sheet: with "action.from.,"action.to","kind.of.action" items with "Name","item.number"
<code>bits</code>	as sting where each enabled action is set to 1 and each disabled action is set to 0
<code>...</code>	Postscript: FALSE (default) or path to PS output file soziogram_layout: layout.auto,layout.random,layout.circle,layout.sphere,layout.fruchterman.reingold,lay curved: how much the lines between the nodes ar curved 0 ist stright, default is 0.2 scal_value: the multiplicator of the nodes, default: 1/3 linesize_add: value to add to the linesize (helpful for a graph with thin lines. default 0 log: log2 size of linewidth, default= false canvas.width: default 1000 canvas.height: default 800 tkplot: interactiv tkplot, default = true

**Value**

sociogram        the igraph object  
 counts\_circles  
                   the count of circles  
 count\_interactions  
                   the count of interactions  
 line\_size        the used linesize  
 counts\_circles  
                   vector of min #' and max line size  
 the last for are helpful to change circle size and #' linewidth

**Author(s)**

Knut Krueger, <Knut.Krueger@equine-science.de>

**Examples**

```
{
## you can either use:
data_sheet=data.frame ("action.from"=c(1,4,2,3,4,3,4,3,4,3,4,3,4,3,4),
                        "action.to"=c(4,1,1,4,3,4,3,4,3,4,3,4,3,4,3),
                        "kind.of.action"= c(4,1,1,4,3,4,3,4,3,4,3,4,3,4,3),stringsAsFactors=FALSE)
items= data.frame ("Name"=c("item1","item2","item3","item4","item5","item6") ,
                  "item.number"=c(1:6),stringsAsFactors=FALSE)
actions=data.frame("name.of.action"= c("leading","following","approach","bite","threat to bite",
                                       "kick","threat to kick", "chase","retreat"),
                  "action.number"=c(1:9),
                  "classification"=c(1,2,1,1,1,1,1,1,2) ,
                  "weighting"=c(1,-1,1,1,1,1,1,1,-1),stringsAsFactors=FALSE)
## all encounters without leading and following
bytes= "001111111"
Sociogram(data_sheet,items=items,actions=actions,bytes)
## mor you can use a complete f.e Excel sheet
## you can save this data as basic excel sheet to work with
data(data_Network_1)
## set 1 for action you want to show
bytes= "00111111111000000000"
Sociogram(data_Network_1,bytes)
}
```

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