

# Report: Illustration Results

Render report for ‘A Gentle Introduction and Application of Feature-Based Clustering with Psychological Time Series’

Last updated: 24 February, 2023

```
# Load variable name lookup table
varNames <- readxl::read_excel("preregistration/varNames.xlsx")

# import full datasets
load("data/s123Full.RData")

# import reduced datasets
load("data/s123Red.RData")

# import pre-calculated features for faster renders
load("data/features/featOut.RData")
#save(featData, featFullImp, file = "data/features/featOutFullImp.RData") # speed up attempt
#load("data/features/featOutFullImp.RData")
```

```
varNamIndicesS1 <- c(
  "autonomy",
  "competence",
  "relatedness",
  "education_level.pre",
  "associationMerged.pre",
  "assimilation.pre",
  "separation.pre",
  "integration.pre",
  "marginalization.pre",
  "VIA_heritage.pre",
  "VIA_Dutch.pre",
  "SSAS_surrounding.pre",
  "SSAS_privat.pre",
  "SSAS_public.pre",
  "assimilation.post",
  "separation.post",
  "integration.post",
  "marginalization.post",
  "VIA_heritage.post",
  "VIA_Dutch.post",
  "rosenberg.post",
  "social_support.post",
  "stress.post",
  "discrimination.post",
  "discrimination_month.post",
  "NLE_1month.post",
```

```

"NLE_6month.post",
"NLE_12month.post"
)

varNamS123Aux <- varNames %>%
  filter(
    aux != 0,
    studyS1 == "S1",
    studyS2 == "S2",
    studyS3 == "S3"
  ) %>%
  select(varNam) %>%
  pull
varNamS1Aux <- varNames %>%
  filter(
    aux != 0,
    studyS1 == "S1"
  ) %>%
  select(varNam) %>%
  pull
varNamS2Aux <- varNames %>%
  filter(
    aux != 0,
    studyS2 == "S2"
  ) %>%
  select(varNam) %>%
  pull
varNamS3Aux <- varNames %>%
  filter(
    aux != 0,
    studyS3 == "S3"
  ) %>%
  select(varNam) %>%
  pull

varNamS123PCA <- varNames %>%
  filter(
    pca != 0,
    studyS1 == "S1",
    studyS2 == "S2",
    studyS3 == "S3"
  ) %>%
  select(varNam) %>%
  pull
varNamS1PCA <- varNames %>%
  filter(
    pca != 0,
    studyS1 == "S1"
  ) %>%
  select(varNam) %>%
  pull
varNamS2PCA <- varNames %>%
  filter(

```

```

    pca != 0,
    studyS2 == "S2"
  ) %>%
  select(varNam) %>%
  pull
varNamS3PCA <- varNames %>%
  filter(
    pca != 0,
    studyS3 == "S3"
  ) %>%
  select(varNam) %>%
  pull

varNamOut <- c(
  "ResponseId",
  "relatednessNoInteraction",
  "relatednessSelf",
  "relatednessOther",
  "autonomy_Int",
  "autonomy_NoInt",
  "competence_Int",
  "competence_NoInt",
  varNamS1PCA[grepl('^MDMQ', varNamS1PCA)],
  varNamS2PCA[grepl('^ProSo|^AntiSo', varNamS2PCA)],
  varNamS3PCA[grepl(
    '^ProSo|^AntiSo|^agency|^autoFrustr|^autoSat|^relatFrustr|^relatSat|^compFrustr|^compSat|^lonely[0-9]|'
    varNamS3PCA
  )]
)
varNamCore <- c(
  "PID",
  "TID",
  "TIDnum"
)
varNamNewAll <- c(
  "relatedness",
  "autonomy",
  "competence"
)
varNamNewS1 <- c(
  "relatedness",
  "autonomy",
  "competence",
  "alertness",
  "calmness",
  "valence"
)
varNamNewS2 <- c(
  "relatedness",
  "autonomy",
  "competence",
  "ProSo",
  "AntiSo"
)

```

```

)
varNamNewS3 <- c(
  "relatedness",
  "autonomy",
  "competence",
  "ProSo",
  "AntiSo",
  "agency",
  "autoFrustr",
  "autoSat",
  "relatFrustr",
  "relatSat",
  "compFrustr",
  "compSat",
  "lonely",
  "emotRegPos",
  "emotRegNeg"
)

varNamNewCat <- c(
  "closeness_Calc",
  "gender_Calc",
  "ethnicity_Calc",
  "relationship_Calc"
)

varNamIntDep <- c(
  varNamS123PCA[grepl('^InteractionContext|AttitudesPartner|KeyNeedDueToPartner|^quality', varNamS123PCA)]
)

varNamIndiceItemsS1 <- varNames %>%
  filter(
    aux == -1,
    studyS1 == "S1"
  ) %>%
  select(varNam) %>%
  pull %>%
  append(., gsub(".pre|.post|_calc", "", varNamIndicesS1)) %>%
  unique

varNamS123MI <- c(varNamCore, varNamNewAll, varNamS123Aux)
varNamS1MI <- c(varNamCore, varNamIndicesS1, varNamS1Aux[!varNamS1Aux %in% varNamIndiceItemsS1]) #
varNamS2MI <- c(varNamCore, varNamNewS2, varNamS2Aux)
varNamS3MI <- c(varNamCore, varNamNewS3, varNamS3Aux)

varNamS123PCA <- c(varNamCore, varNamS123PCA[!varNamS123PCA %in% varNamOut])
varNamS1PCA <- c(varNamCore, varNamNewS1, varNamS1PCA[!varNamS1PCA %in% varNamOut])
varNamS2PCA <- c(varNamCore, varNamNewS2, varNamS2PCA[!varNamS2PCA %in% varNamOut])
varNamS3PCA <- c(varNamCore, varNamNewS3, varNamS3PCA[!varNamS3PCA %in% varNamOut])

varNamS123MIPsbl <- c(
  paste(varNamS123MI, rep(".pre", length(varNamS123MI)), sep = ""),
  varNamS123MI,

```

```

    paste(varNamS123MI, rep(".post", length(varNamS123MI)), sep = "")
  )

varNamS123MiRed <- Reduce(
  intersect,
  list(
    dtS1Red %>% select(PID, TID, TIDnum, any_of(varNamS123MIPsbl)) %>% names,
    dtS2Red %>% select(PID, TID, TIDnum, any_of(varNamS123MIPsbl)) %>% names,
    dtS3Red %>% select(PID, TID, TIDnum, any_of(varNamS123MIPsbl)) %>% names
  )
)

idVars <- c("ID", "PID", "TID", "TIDnum", "date", "week", "study")

```

```

# ID Variables (just to re-iterate)
idVars <- idVars

# Common variables across studies
varNamS123 <- varNamS123PCA[!varNamS123PCA %in% idVars]

# Non-Interaction Specific Variables
varNamS123NoInt <- varNames %>%
  filter(
    varNam %in% varNamS123PCA,
    contactSpecific == 0
  ) %>%
  select(varNam) %>%
  pull

# Interaction Specific Variables
varNamS123Int <- varNames %>%
  filter(
    varNam %in% varNamS123PCA,
    contactSpecific == 1
  ) %>%
  select(varNam) %>%
  pull

# S1 variables
varNamS1Clust <- varNamS1PCA[!varNamS1PCA %in% idVars]

# S1 Non-Interaction Specific Variables
varNamS1NoInt <- varNames %>%
  filter(
    varNam %in% varNamS1Clust,
    contactSpecific == 0
  ) %>%
  select(varNam) %>%
  pull

# S1 Interaction Specific Variables
varNamS1Int <- varNames %>%
  filter(

```

```

    varNam %in% varNamS1Clust,
    contactSpecific == 1
  ) %>%
  select(varNam) %>%
  pull

# S2 variables
varNamS2Clust <- varNamS2PCA[!varNamS2PCA %in% idVars]

# S2 Non-Interaction Specific Variables
varNamS2NoInt <- varNames %>%
  filter(
    varNam %in% varNamS2Clust,
    contactSpecific == 0
  ) %>%
  select(varNam) %>%
  pull

# S2 Interaction Specific Variables
varNamS2Int <- varNames %>%
  filter(
    varNam %in% varNamS2Clust,
    contactSpecific == 1
  ) %>%
  select(varNam) %>%
  pull

# S3 variables
varNamS3Clust <- varNamS3PCA[!varNamS3PCA %in% idVars]

# S3 Non-Interaction Specific Variables
varNamS3NoInt <- varNames %>%
  filter(
    varNam %in% varNamS3Clust,
    contactSpecific == 0
  ) %>%
  select(varNam) %>%
  pull

# S3 Interaction Specific Variables
varNamS3Int <- varNames %>%
  filter(
    varNam %in% varNamS3Clust,
    contactSpecific == 1
  ) %>%
  select(varNam) %>%
  pull

varNames %>%
  filter(
    pca != 0,
    varNam %in% c(varNamS123PCA, varNamS1PCA, varNamS2PCA, varNamS3PCA)
  )

```

```

) %>%
mutate(
  contactSpecific = recode(
    .$contactSpecific,
    `^-1` = "No Interaction Only",
    `^0` = "unspecific",
    `^1` = "Interaction Only"
  ),
  study1 = ifelse(!is.na(studyS1), 1, 0),
  study2 = ifelse(!is.na(studyS2), 1, 0),
  study3 = ifelse(!is.na(studyS3), 1, 0)
) %>%
select(varNam, varGroup, contactSpecific, study1, study2, study3) %>%
group_by(varGroup, varNam, contactSpecific, study1, study2, study3) %>%
summarise(n = n()) %>%
pivot_wider(names_from = c("varGroup", "varNam", "study1", "study2", "study3"), values_from = n, names_prefix = "n_") %>%
ungroup %>%
t %>%
as.data.frame %>%
janitor::row_to_names(1) %>%
replace(is.na(.), 0) %>%
tibble::rownames_to_column(., var = "variable") %>%
separate(variable, c("concept", "variable", "study1", "study2", "study3"), " - ") %>%
mutate(across(c(study1, study2, study3), as.numeric)) %>%
arrange(concept, unspecific, `Interaction Only`) %>%
mutate_all(~recode(.x, `0`="", `1`="X")) %>%
relocate(starts_with("study"), .after = last_col()) %>%
rename_with(., ~ gsub("study", "Study ", .x, fixed = TRUE)) %>%
kbl(.,
  escape = FALSE,
  booktabs = T,
  align = c("l", "l", rep("c", ncol(.)-2)),
  digits=2,
  caption = "Variables by Interaction Types and Study Availability") %>%
add_header_above(c(" " = 2, "Contact Type" = 2, "Study Availability" = 3))

```

```

varNames %>%
filter(
  pca != 0,
  varNam %in% c(varNamS123PCA, varNamS1PCA, varNamS2PCA, varNamS3PCA)
) %>%
mutate(
  contactSpecific = recode(
    .$contactSpecific,
    `^-1` = "No Interaction Only",
    `^0` = "unspecific",
    `^1` = "Interaction Only"
  ),
  study1 = ifelse(!is.na(studyS1), 1, 0),
  study2 = ifelse(!is.na(studyS2), 1, 0),
  study3 = ifelse(!is.na(studyS3), 1, 0)
) %>%
select(varNam, varGroup, contactSpecific, study1, study2, study3) %>%

```

Table 1: Variables by Interaction Types and Study Availability

concept	variable	Contact Type		Study Availability		
		unspecific	Interaction Only	Study 1	Study 2	Study 3
acculturation	AttitudesDutch	X		X	X	X
acculturation	AttitudesPartner		X	X	X	X
contactQuality	InteractionContextAccidental		X	X	X	X
contactQuality	InteractionContextCooperative		X	X	X	X
contactQuality	InteractionContextEqualStatus		X		X	X
contactQuality	InteractionContextRepresentativeNL		X	X	X	X
contactQuality	InteractionContextvoluntary		X	X	X	X
contactQuality	qualityEffective		X		X	X
contactQuality	qualityImportance		X		X	X
contactQuality	qualityMeaning		X	X	X	X
contactQuality	qualityOverall		X	X	X	X
contactQuality	qualityStar		X	X		
emotion	afraid	X				X
emotion	angry	X				X
emotion	energy	X				X
emotion	exWB	X		X	X	X
emotion	lonelyAlways	X				X
needs	autonomy	X			X	X
needs	competence	X			X	X
needs	DaytimeNeedFulfillment	X		X	X	X
needs	DaytimeNeedImportance	X				X
needs	KeyNeedFulfillment	X		X	X	X
needs	KeyNeedImp	X				X
needs	StudentGoal01	X			X	X
needs	StudentGoal02	X			X	X
needs	StudentGoal03	X			X	X
needs	StudentGoal04	X			X	X
needs	StudentGoal05	X			X	X
needs	StudentGoal06	X			X	X
needs	StudentGoal07	X			X	X
needs	StudentGoal08	X			X	X
needs	StudentGoal09	X			X	X
needs	StudentGoal10	X			X	X
needs	KeyNeedDueToPartner		X	X	X	X
needs	KeyNeedShared		X		X	X



Table 2: Variables by Interaction Types and Study Availability

concept	variable	Contact Type		Study Availability		
		unspecific	Interaction Only	Study 1	Study 2	Study 3
acculturation	AttitudesDutch	X		X	X	X
acculturation	AttitudesPartner		X	X	X	X
contactQuality	InteractionContextAccidental		X	X	X	X
contactQuality	InteractionContextCooperative		X	X	X	X
contactQuality	InteractionContextRepresentativeNL		X	X	X	X
contactQuality	InteractionContextvoluntary		X	X	X	X
contactQuality	qualityMeaning		X	X	X	X
contactQuality	qualityOverall		X	X	X	X
emotion	exWB	X		X	X	X
needs	DaytimeNeedFulfillment	X		X	X	X
needs	KeyNeedFulfillment	X		X	X	X
needs	KeyNeedDueToPartner		X	X	X	X

```

filter(study1 == 1 & study2 == 1 & study3 == 1) %>%
group_by(varGroup, varNam, contactSpecific, study1, study2, study3) %>%
summarise(n = n()) %>%
pivot_wider(names_from = c("varGroup", "varNam", "study1", "study2", "study3"), values_from = n, names_prefix = "n_") %>%
ungroup %>%
t %>%
as.data.frame %>%
janitor::row_to_names(1) %>%
replace(is.na(.), 0) %>%
tibble::rownames_to_column(, var = "variable") %>%
separate(variable, c("concept", "variable", "study1", "study2", "study3"), " - ") %>%
mutate(across(c(study1, study2, study3), as.numeric)) %>%
#select(-study1, -study2, -study3) %>%
arrange(concept, unspecific, `Interaction Only`) %>%
mutate_all(~recode(., `0`="", `1`="X")) %>%
relocate(starts_with("study"), .after = last_col()) %>%
rename_with(., ~ gsub("study", "Study ", .x, fixed = TRUE)) %>%
kbl(.,
  escape = FALSE,
  booktabs = T,
  align = c("l", "l", rep("c", ncol(.)-2)),
  digits=2,
  caption = "Variables by Interaction Types and Study Availability") %>%
add_header_above(c(" " = 2, "Contact Type" = 2, "Study Availability" = 3)) %>%
kable_classic(
  full_width = F,
  lighttable_options = "hover",
  html_font = "Cambria"
)

```

## Data Description

```
rmarkdown::render(  
  input = "sections/01DataDescription.Rmd",  
  output_dir = outputDir  
)
```

|| 0% | ..... | 20% ordinary  
text without R code

| .....  
| 40% label: section setup (with options) List of 1 \$ include: logi FALSE

| .....  
| 60% ordinary text without R code

| .....  
| 80% label: missingness filtering | .....  
100% inline R code fragments

/Applications/RStudio.app/Contents/Resources/app/quarto/bin/tools/pandoc +RTS -K512m -RTS  
01DataDescription.knit.md -to latex -from markdown+autolink\_bare\_uris+tex\_math\_single\_backslash -  
output pandoc53e32f4870cf.tex -lua-filter /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/r  
-lua-filter /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/rmarkdown/luatex-  
div.lua -self-contained -template /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/rmd/frag  
-highlight-style tango -pdf-engine pdflatex -citeproc

## Input Variables

```
rmarkdown::render(  
  input = "sections/02InputVariables.Rmd",  
  output_dir = outputDir  
)
```

|| 0% | ..... | 11% ordinary text without R code

| ..... | 22% label: sec-  
tion setup (with options) List of 1 \$ include: logi FALSE

| .....  
| 33% inline R code fragments

| .....  
| 44% label: descriptive-tbl-prep | .....  
| 56% ordinary text without R code

| .....  
| 67% label: unnamed-chunk-3 | .....  
| 78% ordinary text without R code

| .....  
| 89% label: unnamed-chunk-4 | .....  
100% ordinary text without R code

```
/Applications/RStudio.app/Contents/Resources/app/quarto/bin/tools/pandoc +RTS -K512m -RTS
02InputVariables.knit.md -to latex -from markdown+autolink_bare_uris+tex_math_single_backslash -
output pandoc53e373dcc89b.tex -lua-filter /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/
-lua-filter /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/rmarkdown/latex-
div.lua -self-contained -template /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/rmd/frag
-highlight-style tango -pdf-engine pdflatex -citeproc
```

## Feature Extraction

```
rmarkdown::render(
  input = "sections/03FeatureExtraction.Rmd",
  output_dir = outputDir
)
```

```
| | | 0% | |..... | 20% ordinary
text without R code
```

```
| |.....
| 40% label: section setup (with options) List of 1 $ include: logi FALSE
```

```
| |.....
| 60% ordinary text without R code
```

```
| |.....
| 80% label: featMiss | |.....
100% inline R code fragments
```

```
/Applications/RStudio.app/Contents/Resources/app/quarto/bin/tools/pandoc +RTS -K512m -RTS 03Fea-
tureExtraction.knit.md -to latex -from markdown+autolink_bare_uris+tex_math_single_backslash -
output pandoc53e345b198b.tex -lua-filter /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/r
-lua-filter /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/rmarkdown/latex-
div.lua -self-contained -template /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/rmd/frag
-highlight-style tango -pdf-engine pdflatex -citeproc
```

## Feature Reduction

```
rmarkdown::render(
  input = "sections/04FeatureReduction.Rmd",
  output_dir = outputDir
)
```

```
| | | 0% | |..... | 20% ordinary
text without R code
```

```
| |.....
| 40% label: section setup (with options) List of 1 $ include: logi FALSE
```

```
| |.....
| 60% ordinary text without R code
```

```
| |.....
| 80% label: pca | |.....
100% inline R code fragments
```

```
/Applications/RStudio.app/Contents/Resources/app/quarto/bin/tools/pandoc +RTS -K512m -RTS 04FeatureReduction.knit.md -to latex -from markdown+autolink_bare_uris+tex_math_single_backslash -
output pandoc53e3106592cc.tex -lua-filter /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/
-lua-filter /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/rmarkdown/latex-
div.lua -self-contained -template /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/rmd/fragm
-highlight-style tango -pdf-engine pdflatex -citeproc
```

## Feature Clustering

```
rmarkdown::render(
  input = "sections/05FeatureClustering.Rmd",
  output_dir = outputDir
)
```

```
|| | 0% | | ..... | 14% ordinary text without R code
| | .....
| 29% label: section setup (with options) List of 1 $ include: logi FALSE
| | .....
| 43% ordinary text without R code
| | .....
| 57% label: featureClustering | | .....
| 71% ordinary text without R code
| | .....
| 86% label: k-means modeling based on selected k | | .....
100% ordinary text without R code
```

```
/Applications/RStudio.app/Contents/Resources/app/quarto/bin/tools/pandoc +RTS -K512m -RTS 05FeatureClustering.knit.md -to latex -from markdown+autolink_bare_uris+tex_math_single_backslash -
output pandoc53e312bb8046.tex -lua-filter /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/
-lua-filter /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/rmarkdown/latex-
div.lua -self-contained -template /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/rmd/fragm
-highlight-style tango -pdf-engine pdflatex -citeproc
```

## Cluster Evaluation

### Cluster Performance

```
rmarkdown::render(
  input = "sections/06ClusterEvaluationPerformance.Rmd",
  output_dir = outputDir
)
```

```
|| | 0% | | ..... | 14% ordinary text without R code
| | .....
| 29% label: section setup (with options) List of 1 $ include: logi FALSE
```

```

| | .....
| 43% ordinary text without R code

| | .....
| 57% label: cluster perfomance indices | | .....
| 71% ordinary text without R code

| | .....
| 86% label: Plot Performance | | .....
100% inline R code fragments

/Applications/RStudio.app/Contents/Resources/app/quarto/bin/tools/pandoc +RTS -K512m -RTS
06ClusterEvaluationPerformance.knit.md -to latex -from markdown+autolink_bare_uris+tex_math_single_backslash
-output pandoc53e326cafd61.tex -lua-filter /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/
-lua-filter /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/rmarkdown/latex-
div.lua -self-contained -template /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/rmd/frag
-highlight-style tango -pdf-engine pdflatex -citeproc

```

## CLuster Interpretation

```

rmarkdown::render(
  input = "sections/07ClusterEvaluationInterpretation.Rmd",
  output_dir = outputDir
)

```

```

| | 0% | | ..... | 6% ordinary text without R code

| | ..... | 12% label: section setup (with options) List of 1 $
include: logi FALSE

| | ..... | 19% ordinary text without R
code

| | ..... | 25%
label: average feature by cluster | | .....
| 31% ordinary text without R code

| | .....
| 38% label: clusterVariableGrid | | .....
| 44% ordinary text without R code

| | .....
| 50% label: clusterFeatureGrid | | .....
| 56% ordinary text without R code

| | .....
| 62% label: clusterFeatVarComb | | .....
| 69% ordinary text without R code

| | .....
| 75% label: clusterTS (with options) List of 1 $ include: logi FALSE

| | .....
| 81% ordinary text without R code

| | .....
| 88% label: clusterTSTrend (with options) List of 1 $ include: logi FALSE

```

Table 3: R environment session info for reproducibility of results

Setting	Value
version	R version 4.2.1 (2022-06-23)
os	macOS Big Sur ... 10.16
system	x86_64, darwin17.0
ui	X11
language	(EN)
collate	en_US.UTF-8
ctype	en_US.UTF-8
tz	Europe/Amsterdam
date	2023-02-24
pandoc	2.19.2 @ /Applications/RStudio.app/Contents/Resources/app/quarto/bin/tools/ (via rmarkdown)

```

||.....
| 94% ordinary text without R code
||.....
100% label: clusterTsComb (with options) List of 1 $ include: logi FALSE

/Applications/RStudio.app/Contents/Resources/app/quarto/bin/tools/pandoc +RTS -K512m -RTS
07ClusterEvaluationInterpretation.knit.md -to latex -from markdown+autolink_bare_uris+tex_math_single_backslash
-output pandoc53e33cf58f62.tex -lua-filter /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/
-lua-filter /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/rmarkdown/luatex-
div.lua -self-contained -template /Library/Frameworks/R.framework/Versions/4.2/Resources/library/rmarkdown/rmd/frag
-highlight-style tango -pdf-engine pdflatex -citeproc

```

## Software Information

The full session information with all relevant system information and all loaded and installed packages is available in the collapsible section below.

### System Info

→

→

### Package Info

→

→

Full Session Info (including loaded but unattached packages — for troubleshooting only)

**R version 4.2.1 (2022-06-23)**

**Platform:** x86\_64-apple-darwin17.0 (64-bit)

**locale:** en\_US.UTF-8|en\_US.UTF-8|en\_US.UTF-8|C|en\_US.UTF-8|en\_US.UTF-8

**attached base packages:**

- grid
- stats

Table 4: Package info for reproducibility of results

Package	Loaded version	Date	Source
Amelia	1.8.0	2021-05-26	CRAN (R 4.2.0)
anytime	0.3.9	2020-08-27	CRAN (R 4.2.0)
bookdown	0.27	2022-06-14	CRAN (R 4.2.0)
brms	2.17.0	2022-04-13	CRAN (R 4.2.0)
data.table	1.14.2	2021-09-27	CRAN (R 4.2.0)
DescTools	0.99.45	2022-05-09	CRAN (R 4.2.0)
devtools	2.4.3	2021-11-30	CRAN (R 4.2.0)
dplyr	1.0.10	2022-09-01	CRAN (R 4.2.0)
dygraphs	1.1.1.6	2018-07-11	CRAN (R 4.2.0)
ellipse	0.4.3	2022-05-31	CRAN (R 4.2.0)
factoextra	1.0.7	2020-04-01	CRAN (R 4.2.0)
Formula	1.2-4	2020-10-16	CRAN (R 4.2.0)
ggpattern	0.4.2	2022-02-23	CRAN (R 4.2.0)
ggplot2	3.3.6	2022-05-03	CRAN (R 4.2.0)
ggthemes	4.2.4	2021-01-20	CRAN (R 4.2.0)
gratia	0.7.3.17	2022-09-21	Github (gavinsimpson/gratia@dc208fa25c2aa00444d3bb36764f4a3ab78115a)
gridExtra	2.3	2017-09-09	CRAN (R 4.2.0)
gtsummary	1.6.1	2022-06-22	CRAN (R 4.2.0)
haven	2.5.0	2022-04-15	CRAN (R 4.2.0)
Hmisc	4.7-0	2022-04-19	CRAN (R 4.2.0)
jtools	2.2.0	2022-04-25	CRAN (R 4.2.0)
kableExtra	1.3.4	2021-02-20	CRAN (R 4.2.0)
Kendall	2.2.1	2022-03-20	Github (cran/Kendall@c70de62d61746226f13f9324c5616c600448c416)
knitr	1.39	2022-04-26	CRAN (R 4.2.0)
lattice	0.20-41	2020-04-02	CRAN (R 4.2.1)
lme4	1.1-29	2022-04-07	CRAN (R 4.2.0)
lubridate	1.8.0	2021-10-07	CRAN (R 4.2.0)
mada	0.5.10	2020-05-25	CRAN (R 4.2.0)
MASS	7.3-51.6	2020-04-26	CRAN (R 4.2.1)
Matrix	1.2-18	2019-11-27	CRAN (R 4.2.1)
metadat	1.2-0	2022-04-06	CRAN (R 4.2.0)
metafor	3.4-0	2022-04-21	CRAN (R 4.2.0)
mgcv	1.8-31	2019-11-09	CRAN (R 4.2.1)
mgcViz	0.1.9	2021-10-05	CRAN (R 4.2.0)
modifiedmk	1.6	2021-06-10	CRAN (R 4.2.0)
mvmeta	1.0.3	2019-12-10	CRAN (R 4.2.0)
mvtnorm	1.1-3	2021-10-08	CRAN (R 4.2.0)
NbClust	3.0.1	2022-05-02	CRAN (R 4.2.0)
nlme	3.1-147	2020-04-13	CRAN (R 4.2.1)
pander	0.6.5	2022-03-18	CRAN (R 4.2.0)
papaja	0.1.0	2022-06-23	CRAN (R 4.2.0)
plotly	4.10.0	2021-10-09	CRAN (R 4.2.0)
plyr	1.8.7	2022-03-24	CRAN (R 4.2.0)
psych	2.2.5	2022-05-10	CRAN (R 4.2.0)
purrr	1.0.1	2023-01-10	CRAN (R 4.2.0)
qgam	1.3.4	2021-11-22	CRAN (R 4.2.0)
RColorBrewer	1.1-3	2022-04-03	CRAN (R 4.2.0)
Rcpp	1.0.9	2022-07-08	CRAN (R 4.2.0)
readxl	1.4.0	2022-03-28	CRAN (R 4.2.0)
remedy	0.1.0	2018-12-03	CRAN (R 4.2.0)
reshape	0.8.9	2022-04-12	CRAN (R 4.2.0)
reshape2	1.4.4	2020-04-09	CRAN (R 4.2.0)

- graphics
- grDevices
- datasets
- utils
- methods
- base

**other attached packages:**

- NbClust(v.3.0.1)
- shiny(v.1.7.2)
- mgcViz(v.0.1.9)
- qgam(v.1.3.4)
- modifiedmk(v.1.6)
- Kendall(v.2.2.1)
- mgcv(v.1.8-31)
- gratia(v.0.7.3.17)
- DescTools(v.0.99.45)
- ThreeWay(v.1.1.3)
- Amelia(v.1.8.0)
- factoextra(v.1.0.7)
- reshape(v.0.8.9)
- readxl(v.1.4.0)
- dygraphs(v.1.1.1.6)
- metafor(v.3.4-0)
- metadat(v.1.2-0)
- purrr(v.1.0.1)
- lubridate(v.1.8.0)
- anytime(v.0.3.9)
- reshape2(v.1.4.4)
- stringi(v.1.7.8)
- stringr(v.1.4.1)
- papaja(v.0.1.0)
- tinylab(v.0.2.3)
- kableExtra(v.1.3.4)
- Hmisc(v.4.7-0)
- Formula(v.1.2-4)
- survival(v.3.1-12)
- lattice(v.0.20-41)
- tidyr(v.1.2.1)
- dplyr(v.1.0.10)
- plyr(v.1.8.7)
- data.table(v.1.14.2)
- mada(v.0.5.10)
- mvmeta(v.1.0.3)
- ellipse(v.0.4.3)
- mvtnorm(v.1.1-3)
- devtools(v.2.4.3)
- usethis(v.2.1.6)
- pander(v.0.6.5)
- tibble(v.3.1.8)
- sessioninfo(v.1.2.2)
- gtsummary(v.1.6.1)
- jtools(v.2.2.0)



- nlme(v.3.1-147)
- lme4(v.1.1-29)
- Matrix(v.1.2-18)
- ggpattern(v.0.4.2)
- gridExtra(v.2.3)
- plotly(v.4.10.0)
- RColorBrewer(v.1.1-3)
- haven(v.2.5.0)
- ggthemes(v.4.2.4)
- ggplot2(v.3.3.6)
- psych(v.2.2.5)
- brms(v.2.17.0)
- Rcpp(v.1.0.9)
- MASS(v.7.3-51.6)
- bookdown(v.0.27)
- remedy(v.0.1.0)
- knitr(v.1.39)
- rmarkdown(v.2.14)

**loaded via a namespace (and not attached):**

- estimability(v.1.4)
- prabclus(v.2.3-2)
- GGally(v.2.1.2)
- lavaan(v.0.6-11)
- coda(v.0.19-4)
- multcomp(v.1.4-19)
- rpart(v.4.1-15)
- inline(v.0.3.19)
- doParallel(v.1.0.17)
- generics(v.0.1.3)
- cowplot(v.1.1.1)
- callr(v.3.7.0)
- mvnfast(v.0.2.7)
- TH.data(v.1.1-1)
- proxy(v.0.4-27)
- webshot(v.0.5.3)
- xml2(v.1.3.3)
- httpuv(v.1.6.6)
- StanHeaders(v.2.21.0-7)
- assertthat(v.0.2.1)
- viridis(v.0.6.2)
- xfun(v.0.31)
- hms(v.1.1.2)
- bayesplot(v.1.9.0)
- evaluate(v.0.15)
- promises(v.1.2.0.1)
- DEoptimR(v.1.0-11)
- fansi(v.1.0.3)
- igraph(v.1.3.4)
- DBI(v.1.1.3)
- htmlwidgets(v.1.5.4)
- tensorA(v.0.36.2)
- stats4(v.4.2.1)

- ellipsis(v.0.3.2)
- crosstalk(v.1.2.0)
- ggpubr(v.0.4.0)
- backports(v.1.4.1)
- pbivnorm(v.0.6.0)
- insight(v.0.17.1)
- markdown(v.1.1)
- RcppParallel(v.5.1.5)
- websocket(v.1.4.1)
- vctrs(v.0.5.2)
- remotes(v.2.4.2)
- abind(v.1.4-5)
- cachem(v.1.0.6)
- withr(v.2.5.0)
- robustbase(v.0.95-0)
- checkmate(v.2.1.0)
- emmeans(v.1.7.5)
- xts(v.0.12.1)
- prettyunits(v.1.1.1)
- mclust(v.5.4.10)
- mnormt(v.2.1.0)
- svglite(v.2.1.0)
- cluster(v.2.1.3)
- lazyeval(v.0.2.2)
- crayon(v.1.5.1)
- labeling(v.0.4.2)
- pkgconfig(v.2.0.3)
- pkgload(v.1.3.0)
- nnet(v.7.3-14)
- diptest(v.0.76-0)
- rlang(v.1.0.6)
- lifecycle(v.1.0.3)
- miniUI(v.0.1.1.1)
- colourpicker(v.1.1.1)
- sandwich(v.3.0-2)
- mathjaxr(v.1.6-0)
- rprojroot(v.2.0.3)
- cellranger(v.1.1.0)
- distributional(v.0.3.0)
- matrixStats(v.0.62.0)
- datawizard(v.0.4.1)
- loo(v.2.5.1)
- carData(v.3.0-5)
- boot(v.1.3-28)
- zoo(v.1.8-10)
- base64enc(v.0.1-3)
- gamm4(v.0.2-6)
- ggrridges(v.0.5.3)
- processx(v.3.6.1)
- png(v.0.1-7)
- viridisLite(v.0.4.1)
- parameters(v.0.18.1)
- rootSolve(v.1.8.2.3)
- KernSmooth(v.2.23-17)

- rstatix(v.0.7.0)
- jpeg(v.0.1-9)
- shinystan(v.2.6.0)
- ggsignif(v.0.6.3)
- scales(v.1.2.1)
- memoise(v.2.0.1)
- magrittr(v.2.0.3)
- threejs(v.0.3.3)
- compiler(v.4.2.1)
- rstantools(v.2.2.0)
- snakecase(v.0.11.0)
- cli(v.3.6.0)
- patchwork(v.1.1.2)
- ps(v.1.7.1)
- Brobdingnag(v.1.2-7)
- htmlTable(v.2.4.0)
- tidyselect(v.1.2.0)
- forcats(v.0.5.1)
- mixmeta(v.1.2.0)
- projpred(v.2.1.2)
- highr(v.0.9)
- webshot2(v.0.1.0)
- yaml(v.2.3.5)
- latticeExtra(v.0.6-29)
- ggrepel(v.0.9.1)
- bridgesampling(v.1.1-2)
- tools(v.4.2.1)
- lmom(v.2.9)
- parallel(v.4.2.1)
- rstudioapi(v.0.13)
- foreach(v.1.5.2)
- foreign(v.0.8-79)
- misty(v.0.4.6)
- janitor(v.2.1.0)
- gld(v.2.6.5)
- posterior(v.1.2.2)
- farver(v.2.1.1)
- digest(v.0.6.29)
- fpc(v.2.2-9)
- car(v.3.1-0)
- broom(v.1.0.0)
- later(v.1.3.0)
- httr(v.1.4.4)
- kernlab(v.0.9-31)
- effectsize(v.0.7.0)
- colorspace(v.2.0-3)
- rvest(v.1.0.2)
- fs(v.1.5.2)
- splines(v.4.2.1)
- rematch2(v.2.1.2)
- expm(v.0.999-6)
- Exact(v.3.1)
- flexmix(v.2.3-18)
- renv(v.0.15.5)

- shinythemes(v.1.2.0)
  - systemfonts(v.1.0.4)
  - xtable(v.1.8-4)
  - jsonlite(v.1.8.0)
  - nloptr(v.2.0.3)
  - rstan(v.2.21.5)
  - modeltools(v.0.2-23)
  - chromote(v.0.1.0)
  - gt(v.0.6.0)
  - R6(v.2.5.1)
  - pillar(v.1.8.1)
  - htmltools(v.0.5.3)
  - mime(v.0.12)
  - glue(v.1.6.2)
  - fastmap(v.1.1.0)
  - minqa(v.1.2.4)
  - DT(v.0.25)
  - class(v.7.3-17)
  - codetools(v.0.2-19)
  - pkgbuild(v.1.3.1)
  - utf8(v.1.2.2)
  - curl(v.4.3.2)
  - gtools(v.3.9.2)
  - shinyjs(v.2.1.0)
  - munsell(v.0.5.0)
  - e1071(v.1.7-11)
  - iterators(v.1.0.14)
  - broom.helpers(v.1.7.0)
  - gtable(v.0.3.1)
  - bayestestR(v.0.12.1)
-